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BACTERIOLOGY AND PATHOLOGY.

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BY GEO. W. COOK, B. S., D. D. S., CHICAGO.

All matter is divided into two general classes, namely: organized and unorganized. Organized matter being that form which is capable of life. Unorganized matter being that form which has no property of life whatever. In our work on Bacteriology and Pathology we shall treat of organized matter only.

The Biologist, in his attempt at a classification of organized matter, has placed a large group of very low vegetable forms under the name *bacteria.*

These low forms are very hard to differentiate from the lower algae and fungi, into both of which they seem to pass, not directly, but through many transitional forms.

MORPHOLOGY: Bacteria are generally defined as small cells from two (2) to five (5) microns, (.001 millimeter, or the .001 part of .03937 inch) in thickness, generally without chlorophyl, and usually takes on one of the following forms: Spherical or cocci forms; bacillary or rod-like forms, length two (2) to eight (8) times the width; and thread and spiral forms.

There may be numerous other modifications of these forms, viz.: screw forms, spindle forms, clubbed forms, branched forms, etc.

GROWTH GROUPS: When spherical bacteria grow in pairs seemingly touching each other, they are termed diplococci. When spherical bacteria grow in chains they are termed streptococci, and when in bunches—staphylococci. All rod-shaped bacteria are called bacilli, and as in the case of the spherical bacteria, may grow singly, in pairs, or in long chains.

Another point of interest is the manner in which bacteria multiply and propagate their species. In the vegetable world we recognize two ways of propagation which are entirely dis-

tinct from each other, and subserve two purposes; the first is simple multiplication and is a vegetative process. This process is well illustrated in the algæ and fungi and can be easily observed in certain of the creeping vines. These plants grow and increase by a process of budding or shooting off from the original plant, each bud or sprout being capable of developing into a plant similar to the parent plant. In the creeping vines the school boy has observed at certain definite points along the vine, that roots strike down into the earth, and if the vine be severed between the parent plant and the point of sprouting, an entirely separate vine is formed which draws its own nourishment from the earth instead of from the mother vine. This illustrates simple vegetative multiplication as observed everywhere in vegetables. But the tender algæ or fungi could not propagate its specie in this way. Vegetable life is very susceptible to injurious influences. The intense heat of the sun or lack of moisture may destroy them, or the autumn frosts would cut short the life of the tender plant, leaving nothing whereby the species could be propagated. But nature has wisely made a provision for this. In the vegetable the species propagation is maintained through a process of *sexual fertilization.* This process is very imperfectly understood, but is none the less a fact. The result of this fertilization is the formation of seeds which, unlike the tender plant, are very resistant to injurious agencies. The seeds of the plant will resist the winter cold, will remain perfectly dry for years, or withstand a high degree of heat, and yet when placed in the warm, moist earth develop into the same species of plant from which it developed. Thus we find that plants may multiply by vegetative budding, or by sexual seeding. If the external condition remain uniformly favorable to plant growth as regards heat, moisture, oxygen and food supply the former will suffice for both multiplication and the propagation of the species, but, as is always the case, where conditions so change as to destroy the vegetative function of the plant, the sexual propagation becomes necessary on account of its greater powers of resistance.

Going back to bacteria again, we find an analogous condition under favorable conditions; bacteria multiply by direct cell division, the division nearly always taking place in a transverse direction. This one bacillus or coccus will divide into two, and

they again into two and so on indefinitely. This division goes on very rapidly, so in a comparatively short time the number of cells becomes an innumerable multitude. But the prolongation of bacterial life depends largely on external conditions. Weak solutions of certain chemicals as corrosive sublimate (mercuric chloride), will destroy them; lack of oxygen is very deleterious to many kinds of bacteria; also direct sunlight, to say nothing of a freezing or a boiling temperature, both of which will immediately destroy the vegetative growth of bacteria. Every variety of bacteria has its most favorable temperature for growth. In fact the vegetative life of bacteria is possibly only within a temperature ranging from 0° to 70° C. For most varieties 35° to 42° is the most favorable.

Just as in the higher plants, bacteria are provided with a sexual process of fertilization which results in the formation of spores, which are analogous to the seeds in the higher plants. In bacteria, the spores are round or oval, strongly refracting bodies, situated in the interior of the cells. These bacterial seeds as compared with the bacterial cells are very resistant to injurious agencies, being unlike plant seeds, they require no nourishment and no water in order to retain their ability to germinate after years.

Temperature below zero does not destroy them and they will even retain a temperature of 100° C. for some time. They will remain in a dry state for years and yet develop when placed under favorable conditions. So we say: *bacteria grow and multiply by direct cell division and propagate their species by spore-formation.*

Thus we can readily understand why it is often so difficult to destroy bacteria by means of sterilization, which is simply a process of changing the external conditions, so as to destroy the bacteria. A temperature of 100° C. for ten minutes will kill nearly all bacteria, but the spores may resist this temperature for many hours. So in complete sterilization we must take into consideration both the destruction of the bacterial cells and also of the spores. To make sterilization effective the process should be repeated at intervals of 24 hours, for three or four times, thus in the meantime giving the spores an opportunity to germinate, so that the heat may act upon them.

For the growth of bacteria certain environments are necessary. First, they must have a food supply, and second, warmth and moisture. Under the influence of a favorable degree of heat (35°-42° C.) and the necessary degree of moisture, most bacteria are able to abstract their nourishment from material sources. For their growth carbon (C), oxygen (O), nitrogen (N) and hydrogen (H) are absolutely necessary as fundamental food elements. In addition to these certain of the metallic electrolites such as potassium, sodium, calcium, magnesium, chlorine, phosphorus, etc., must be present. As few of these elementary substances are found free in nature, but are more or less in combination with each other in the form of salts, oxides or hydroxides, bacteria must get their nutrition from their combinations.

In nature oxygen exists free in the air, forming about 21 part. It also exists in numerous combinations, as in carbon-dioxide CO_2, in the nitrates (NO_2) and nitrites (NO). Some bacteria get their necessary oxygen directly from the air (aerobic bacteria), while others seem to have no power to utilize free oxygen but get their oxygen from oxygen compounds, by a process of disassociation (anaerobic bacteria) which will be discussed later. Some other bacteria have the capacity to obtain oxygen from both sources. The carbon necessary for vegetative growth comes from the carbon dioxide (CO_2) and in the case of bacteria it is often obtained from some of the higher vegetable carbon compounds, as the starches ($C_6H_{10}O_5$) sugars ($C_6H_{12}O_6$) and cane sugar ($C_{12}H_{22}O_{11}$). Hydrogen (H) also can be obtained from these compounds, the nitrogen is derived from the nitrates KNO_3, $NaNo_3$, Ca (NO_3), NH_4NO_3 and the nitrites KNO_2, $NaNo_2$, Ca (NO_{22}), NH_4NO_2, etc. Ammonia (NH_3) is one of the chief sources for both nitrogen (N) and hydrogen (H). Sodium chloride (NaCl) is always necessary for life of all kinds and is so widely distributed in nature that there is little trouble in obtaining it.

In nature all vegetable organisms including bacteria obtain their food from these sources. The process involves a question of *biological chemistry or the reaction between organized living matter and unorganized matter, whereby the former transforms the latter into itself and returns it again to nature as lifeless substances.*

The fact that low forms of vegetable life can assimilate inorganic substances, or in other words derives their substance from inorganic salts, oxides and hydroxides, brings us up to the chemical question of catalitical chemical action, or action by contact. By this we mean the power of a certain substance by its mere presence or contact with another substance to disassociate its molecular structure, separating its elementary *atoms* or *ions*. If we pass an electric current through water containing sodium chloride (NaCl) in solution, the molecules of NaCl are separated into a Na ion and a Cl ion, or by placing a piece of metallic sodium in some water (H_2O) the water is disassociated into $\overset{+}{H}\ \overset{+}{H}-\overset{-}{O}$, we may state this in the language of a chemical law: *There can be no chemical action between different substances in their molecular state but first disassociation must take place so that the atoms which compose the substance entering into the action may recombine, forming the new combination resulting from the primary action.* Thus, when sodium hydrate (NaOH) comes in contact with hydrochloric acid (HCl) the first action is one of disassociation as shown in the following formula:

$$\overset{+}{Na}-\overset{-}{OH}+\overset{+}{H}-\overset{-}{Cl}=\overset{+}{Na}-\overset{-}{Cl}\ \overset{-}{H}-\overset{H}{O}.$$

The second reaction is the formation of a new compound, sodium chloride and water after the following equation, $\overset{+}{Na}-\overset{-}{OH}$ $+\overset{+}{H}-Cl=NaCl+H_2O$. In like manner living organisms have the power of acting on such compounds as the inorganic nitrates, nitrites, carbonates and ammonia (NH_3) compounds disassociating them into C. H. N. O. Cl. etc., and reuniting them into organized molecules capable of life. In fact many of the inorganic compounds from which the higher plants are able to draw their nourishment are first disassociated by the presence of bacteria in the soil. Nitrates are reduced to nitrites, and then to free nitrogen, Ammonia (NH_3) is disassociated into free nitrogen (N) and free hydrogen (H), etc.

But to study bacteria systematically so as to isolate the different species for study, we find it necessary to grow them on an artificial food media. For the mere purpose of growing bacteria

most any organic matter containing salts will do, as the cut surface of potatoes, potato water, meat bouillon, fluid and coagulated blood serum, meat, bread, rice water cooked, or raw eggs, etc. But these would not suffice for the purpose of investigation. In nature we find all kinds of bacteria growing together, or as much together as the one will permit the other. Therefore to study individual species of bacteria, it was found necessary to devise some food media in which a separation could be readily made; for this purpose Professor Koch gave to the scientific world the reversible gelatins which come admirably into play. By reversible gelatins or colloids, we mean certain animal and vegetable colloid substances which at ordinary temperatures (15°-25° C.) assumes a jell-like mass, but as the temperature is raised to above 25° C. it passes into a liquid form or a hydo-jell without any change in its constitution. Thus it is reversible from a liquid to a solid state and *vice versa*, within the range of the temperature of bacterial development. Ager-ager or Japanese isinglass is a colloid substance found in certain plants, which acts as animal gelatin as regards heat and cold, only it melts at 80° C. instead of 25° C., and must be cooled to 40° C. before benig used. These colloids differ from albuminous colloids, such as blood serum and the white of eggs, which when heated, coagulate and will not return to their original form when cooked. They are not reversible. The advantage for using the reversible colloids as a food media in bacterial study is in the separation of germs in order to obtain pure culture, which is done in the following manner: Place some gelatin bouillon (how to make described later) in each of their test-tubes, about two inches in each tube and place the tubes in warm water (30°-35° C.) till the gelatin melts. In the first tube add one drop of the fluid containing the bacteria to be examined, and stir till well mixed; this process we call inoculation. From the first tube take a drop and add to the second tube and treat in like manner, and from the second inoculate the third, then pour the contents of each tube out on sterilized glass plates (4x4 in.) and cool till solid. In this way the germs are separated so that on the second and third plates no two will be together, and the growth on these plates will be from the division of an individual bacterium.

Agar-agar bouillon can be handled in the same way, only it passes into solution too high for the growth of most bacteria and must be cooled to at least 40° C. and quickly inoculated as already described, and poured on plates. Agar-agar plates have the advantage over the gelatin, in that they can be placed at a more favorable temperature for bacteria to grow (35° to 40° C.) without melting.

Coagulated blood serum is employed especially for growing certain pathogenic varieties which grow poorly or not at all, on other nutrient media.

The ordinary gelatin nutrient is made about as follows: (a) From meat: 500 grains of lean beef are boiled in 1,000 cubic centimeters of water for one-half hour, and filtered. To this filtrate (meat infusion) is added enough water (H_2O) to make 1,000 cc. of the solution, and to this is added 10 grains peptone and 5 grains sodium chloride. This is placed in a steam chamber until dissolved and the whole is carefully neutralized with normal sodium, hydroxide (NaOH) or sodium carbonate ($NaCO_3$) (Phenolpthalem being used as an indicator). This constitutes a nutrient bouillon to 1,000 cc. of which add 100 grains gelatin and a solid gelatin media results, or 10 grains of agar-agar and a nutrient agar media results.

Considering the chemistry of the two reversible food media, we find nearly all the conditions necessary for bacterial growth. The meat infusion contains all the soluble salts of the meat as K Cl, CA Cl_2, $NA_2So_4P_2O_5$ and some of the xanthene bases, which are ammonia compounds. The infusion is somewhat lacking in sodium chloride so some salt meat must be added. As it contains some acid salts, such as the acid phosphates and carbonates, it must be rendered neutral or very slightly alkaline, by sodium hydrate (NA O H).

The peptones which are added is a non-coagulable proteid or an albumin, and furnishes a source of nitrogen supply. Other substances are often added as sugar, glycerine, etc. The gelatin and agar-agar are not the real food media, but serve as a binder for the salts, peptones, sugars, etc., from which bacteria draw their nourishment. In fact the colloids simply make a solid solution of these salts and other diffusable substances. This alone causes a partial disassociation of the substances held in solution;

and in weak solution (½%) almost a complete disassociation. So in this the colloids while not acting directly as a food, tend to render the food principle more easy of assimilation. This is a point not always recognized in bacterial cultivation.

In fact, low vegetable forms will grow in certain dilute solutions of salts without any colloids substance, as the following solutions:

Sodium chloride (NA Cl)	grm.	5
Sodium phosphate (NA_3PO_4)	grm.	2
Ammonium lactate	grm.	6
Asparagon	grm.	4
Water (H_2O)	cc.	1,000

or

Sodium chloride (NA Cl)	grm.	5
Sodium phosphate (NA_3PO_4)	grm.	2
Ammonium lactate	grm.	4
Calcium chloride (Ca Cl)	grm.	0.1
Magnesium sulphate (Mg SO_4)	grm.	03
Water (H_2O)	cc.	1,000

The addition of from 2%-4% glycerine (C_2H_5 (OH)) and a little glucose ($C_6H_{12}O_6$) to a solution of salts as above, materially aids bacterial growth.

In these synthetic compounds, such as sugar and glycerine, there is a kind of a doubling up on the atoms in the molecule. This phenomena is known in chemical language as polymerization. In the process of breaking down these organic substances, by catalytic action of bacteria is the loosening of these bonds of polymerization in the molecule which is the process of hydration or entrance of water, and through oxidation this can be explained in the following manner: Thus formic acid $(CH_2O_2)+(H_2CH_2)=O+H_2O$. In the decomposition of sugar in the presence of oxygen a greater number of heat units is given off. However, if it be split into butyric acid, hydrogen and carbon dioxide, there is a great deal less energy liberated. So in food media, sugar and an especially chemically formed sugar is of special benefit in the growth and maintenance of the cell energy in bacterial life.

There is found in this low form of vegetable life a phenomena known to no other living thing, that is, they are able to

live in certain culture media without the free oxygen of the air. This process is known as anaerobiasis, this observation was made by Pasteur, when he established the fact that fermentation was due to the micro-organism. When bacteria act upon certain substances excluded from the oxygen of the air, there are certain changes that may take place which is not strictly in accordance with the decomposition process, but is a rearrangement of the atom groupings in the molecules. In this way they draw their nutrient oxygen from the molecule in a way that does not decompose the substance very rapidly, for instance, the hydroxyl radical (OH) chemically coming in contact with the carbon (C) bringing about a chemical change by which hydrogen (H) is liberated, combining with sulphur (S) forming sulphurated hydrogen (H_2S), a part of the oxygen (O) uniting with the carbon (C) atoms forming carbon dioxide (CO_2). This chemical change can take place by the action of certain bacteria acting on media absolutely excluded from the air. It is understood, however, that the compounds thus to be acted upon must be very unstable chemical compounds. In such experimental work as this, we could not use an unorganized solution such as those formulas given above, for they do not contain a chemical complex substance. Thus, such solutions could only maintain the life of those forms of bacteria that live in the presence of the free oxygen of the air (aerobic). (It has, however, been found by some observers that available oxygen can be obtained from inorganic sources.)

This process of anaerobiasis is of special importance from a chemical, biological, and pathological standpoint.

For it is a well known fact that secondary oxidation of the primary decomposition products seldom, if at all, takes place under an anaerobiotic-acic condition. In the so-called bottom fermentation, anaerobiacic, plays an important role, but this is a question we shall not discuss at the present time. With pathogenic bacteria, Hueppe and Fajan found that the germs of cholera grown under pathogenic conditions retain their virulence weeks, even months, after control cultures, that had been grown in the air, lost their pathogenic property. Bunzul and Fellern found that the same is true of the pneumonia germ. These investigators found that germs grown without the free oxygen of the air would

produce more toxine under anaerobic conditions than in the presence of the free oxygen of the air. They also found that this toxine (or poisonous products) were much more easily destroyed by oxygen. Reasoning thus, we can say that the adaptation of germs to their environment is of great importance, both from a hygienic and biologic standpoint. For a number of observers have shown that many of these anaerobic bacteria can be made to grow in the free oxygen of the air, while the aerobic can adapt themselves to anaerobic growth. This brings up a question that has caused considerable investigation as to the movement of cell life to or away from certain dilatory agents, and also the reasons why pathogenic bacteria may change their pathogenic properties when all of the necessary nutrient substances are not present for the preservation of this pathogenic condition, for it has been observed by all who have investigated the subject of infectious germs and their artificial cultivation that it is a difficult matter to cultivate them artificially and have them retain their disease-producing power for any great length of time when cultivated.

A biological phenomenon that was first investigated by Stahl, Engleman and later by Jennings, who has shown that micro-organisms will migrate towards a certain amount of oxygen as for instance: They will take a certain position in the fluids in which they are suspended, in order that they may live in the certain tension of oxygen. This peculiar biological phenomenon is called chemotaxis, and when these living organisms move towards the light or oxygen this is called positive chemotaxis, while if they move in the opposite direction or take up a position away from the sunlight this is called negative chemotaxis, and is well illustrated in many forms of bacteria, as well as some of the amoeba.

Pfeffer studied this physiological process in the spermatozoid of ferns which showed clearly their chemotactic relation to the egg cell. This is now a well known, indispensable process in the fertilization of the animal ovum. The sperm cells of all living things are led in the right path by the chematoctic action which the metabolic product of the egg cell exerts upon the sperm cell. We can not go into a discussion of the subject with its relation to cell physiology in general, but it will be referred to from time

to time when we discuss pathogenic bacteria and their action on tissue.

We know that light and air are sometimes quite necessary for some bacteria to fulfill all their possibilities, but most bacteria are better adapted to live excluded from the light; many bacteria die when placed in direct sunlight, as, for instance, the tubercular bacillus. I have seen, before the present method of treating by X-ray and Funson apparatus (the latter of which is being used extensively in London for treating various forms of lupus), patients suffering with military tuberculosis opened up and the direct sunlight allowed to enter the abdominal cavity, and, as was said by the late Dr. Fenger, patients were many times materially benefited by such treatment. There is not experimental evidence sufficient to warrant the statement that the pigment forming bacteria are influenced by light to any great extent. It was found, however, by Zopf that the bacterium producing a purple pigment gave a better growth in cultures placed in the light. This pigment, however, was looked upon by Engelmann as being like chlorophyl or leaf green and was a matter of taking up carbon dioxid. There is an interesting biological phenomenon found in those bacteria producing a phosphorescent light. When grown in the presence of air this vital phenomenon is found in the decomposition of meat and fish and is most beautifully demonstrated in sea water. These luminous bacteria must be well supplied by oxygen; many will grow anaerobic, but their phosphorescence will be completely lost if they are long deprived of oxygen.

(FISH BOILED AND THE BOUILLON TREATED.)

J. B. Brown, M. D., and myself worked with some of these and found when they were cultivated as anaerobic germs, they in a number of instances produced acid and would quickly change from an acid producer to that of a luminous state when the oxygen was turned on again. This peculiar phenomenon is given here as illustrating the variability of this low form of life. If any one is interested in this phase of the subject, I can do no better than refer them to the investigation of Pfluger, Fisher, Beyerinck, and Wiliminsky. In this connection it is well to briefly mention another phase of bacterial activity which from a chemical standpoint differs widely from that interesting physi-

ological process just discussed. The phenomenon of pigmentation, this chemical substance seems to come from the decomposition of proteids and in general, the substance itself seems to take on the characteristics of proteids. There is to be found nearly all the color in this remarkable physiological bacterial substance, the blue pigment of blue milk, is of a proteid origin. It can be formed, however, out of ammonia compounds; it also can be found in the analysis of sugar and is a synthetic produced from milk sugar. The yellow pigment found in fatty tissue (lipochin) is produced by bacteria, and the red pigment that is produced is what is called the nuracle bacterium.

This red pigment is very much on the order of the analine dyes, some authors claim it has almost the same chemical constituent.

(To be continued.)

PATENTS VS. PROFESSIONAL ETHICS.

BY CHAS. E. BENTLEY, D. D. S., CHICAGO.

(*Abstract of paper read before the Illinois State Dental Society at Springfield, Ill., May* 13-15, 1902.)

It is quite the customary thing now-a-days to inveigh against commercialism—that desire for gain which, they say, is threatening to deluge the world and to sweep aside all things that cannot be quoted in terms of dollars and cents. Greed of gain is a modern fever, we are told, from which no part of the body politic is immune. To my mind this is glaringly untrue. These selfish human quantities are as old as man, and if in this 20th century unbounded opportunity and almost unrestricted resources, natural and artificial, give them a larger place and more prominent setting in the drama of life, the powers which hold them in check, brotherhood, altruism and co-operation, have grown in like proportion, the equilibrium has been preserved. In fact, I must go further and assert that in no stage of history has there been a deeper and a wider sense of a common tie—a deep underlying sense of brotherhood, which is so inimical to personal selfishness, and which subserves the use of each for the good of all. *Exclusiveness* can have no place where liberality

and humaneness make for breadth and depth and nobility in life, on whatever line of activity. *Exclusion*—the cutting off of my brother from things that are mine—leaves me within a selfish enclosure where there is stagnation and decay. Inclusiveness, sharing, brotherly exchange of mine and thine, means growth, movement, virility and all the powers which make for progress.

Of all the places where exclusiveness seems to be most inappropriate, none is more so than that which is in what is known as a liberal profession. The name itself indicates that to which exclusiveness is most deadly, and stands for all that makes for unselfish devotion and high use for the service of humanity.

Dentistry, from being a mere handicraft, has, by years of hard and noble labor by its devotees, been lifted to a proud place among the useful arts and among the liberal professions. Progress connotes obligation. In using and spreading and developing as the profession has done, it has incurred the obligations of its elevated position. *Noblesse oblige,* and from the heights to which we have climbed we cannot afford to close our minds and senses to the highest impulses of our times. Sharing, helping, giving as well as receiving, must be our mutual spirit if we would keep abreast of the highest and the best; and if there be any habit or custom of a contrary nature which has come to us out of an old order of things, we must put them aside, stamp them out, before we can reasonably place ourselves in the front ranks of those modern things which are of the highest morality.

From this point of view, then, is it justifiable in a dentist to restrict in any measure the use of an invention whose purpose is to relieve suffering and to facilitate the labors of fellow-workers? Such action, to my mind, is diametrical to the ethics of our profession. It not only repudiates the debt which all men owe to progress and to advance of his own special era, but it directly evades that more direct personal obligation which every man should acknowledge to the profession which has done so much for him—which has supplied him with the ability to make the very thing whose free use he denies to her when he places it under the greedy hands of a patent.

The college curriculum itself, that medium by which the embryo is made into an actual dentist, is but the accumulation

of knowledge—of systems, of methods and of ideas—to which thinking, studious, inventive minds have contributed through all the years. This vast treasure house is open to the new comer without let or hindrance. He freely helps himself, uses what he takes for his convenience and profit; then as soon as he sees a method or an idea which will still further increase this treasure, and whereby he may be able to do for others what has already been so freely done for him, forthwith he keeps it to himself and proceeds to build an enclosure around his creation, exacting toll from all who desire to share its benefits.

Emmerson says, in his essay on Compensation, "Benefit is the end of nature. But for every benefit you receive a tax is levied. He is great who confers the most benefit. He is base—and that is the one base thing in the universe—who receives favors and renders none."

A man who thoroughly digests and assimilates this truth from one of the world's wise men, would be only too glad to give of his very best, in order that he may escape the baseness of receiving and receiving only.

It seems strange to me that, although we, as a profession, have made such marvelous progress within the last decade, we still make no advance in this matter of patents, standing with hesitating feet because of divided opinion. The history of other professions seems to me to be sufficient guide to decision—even if purely ethical ideas have little weight with some. No other liberal profession harbors this selfish practice to any appreciable extent. In the world of arts and crafts and pure mechanics patents have their place and need no argument to defend their *raison d'etre.* But the very nature of a liberal profession prohibits a dental doctor—and doctor in its truest meaning is teacher—from this method of exclusion. To my mind, every man who patents tacitly places his calling among the crafts or trades and forfeits his place in the ranks of professional men. I fully agree with one of the brightest minds in our profession (Dr. Rollins) when he says, "So long as members of the profession who patent their inventions and make money on them are honored to the extent in our power by being asked to be leaders in our schools and before societies, so long will dentistry remain a trade, and I, for one, shall be ashamed to use my dental degree."

The medical profession has long outgrown this practice. The man who patents his drugs, his methods or his instruments is soon relegated to the realm outside the ethical ranks, and in some countries the physician who resorts to such money-making process forfeits his diploma.

We claim that we are a branch of that noble profession of medicine, and during the last quarter of a century we have fully demonstrated the justice of that claim—nay, in several instances the younger branch has led the older in some directions never tried before. We cannot, then, afford to pursue practices which experience and lofty development have shown the older branch to be wrong and retrogressive. The husks which our senior brothers have outgrown and cast aside, if we rescue them from the dust heaps of primitive customs and deck ourselves with their shameful covering, can we reasonably expect to stand side by side with that other and claim the same respect and recognition from just and sensible people? And again, one who enters as a newcomer into a household already established and organized, must accept the rules and regulations which he finds there. He cannot expect to impose his ideas in the place of those already well established by time and experience. If he come within he must conform; if he cannot conform, *he must stay outside.*

But dentistry is within the household, and the time is near at hand when those dentists, just as those physicians who patent, will be considered apart from the brotherhood of bona fide scientists.

"But I am entirely within my legal rights when I patent my invention," says one. Granted—granted instantly. But, my friends, this is not a question of law but of *professional ethics.* The law takes no note of the ethical quality of action, and it is the ethical quality of our acts, and that alone, which raises us above the ranks of craftsmen and places us with other liberal professions. The question of dental patents is a purely moral one and can be approached in no other light. The man to whom this appeal means nothing, who is unable to see but the dollar mark in all things, of course, will continue to patent; but the point is that the established code of our great calling be such that in doing so he will immediately read himself out of the legitimate ranks of the profession.

Looking at the matter from a commercial point of view, even, the upholders of patenting fail to prove there is ever any commensurate gain to the patentee. On the contrary, the several cases of litigation, the squabbles and the cases of unseemly quarrels that have blotched professional history, have, as a rule, sprung from patenting. The mistake of Morton's life was the patenting of the discovery of ether. As a free gift to humanity its source would have never been challenged, but as soon as the process of exclusion began, the right to priority of conception immediately was challenged, and the war was on.

How different the case of the Roentgen rays and the discovery of anti-toxin. Given freely to the world, humanity relieved of the peculiar ills to which they have been applied, rises from its sufferings and calls their creator blessed.

Suppose Black and Johnson had sold office rights for Extension for Prevention in Cavity Preparation. How much good work would have been made impossible in general office practice, and how much human suffering must necessarily have gone unrelieved.

The present case in litigation of the International Tooth Crown Company is the *reductio ad absurdum* of patenting in our profession. It is carrying the reason of the patent advocate to its logical limit—and what an absurd and monstrous limit that is no practicing dentist has any doubt of. It is the greatest possible transgression of professional ethics that one of us should bargain and sell to an outsider, and by so doing enable that outsider to fatten off professional labor; that he should put it within the power of that outsider to embarrass and mulct his professional kin to an unmeasurable degree. This is what the notorious case of the N. T. Cr. Co. seeks to establish. This case has, however, done one good thing for the profession: it has formed the dark background which brings out in brightest colors the high character, unselfish zeal and manly worth of one of our number. It has afforded us the opportunity of seeing put to actual, practical, material test that professional honor which is so dear to us all. Too much can never be said in appreciation of Dr. J. N. Crouse in the battle which he is still fighting against this moneyed cor-

poration. Like a mighty bulwark, strengthened by a high principle, he has placed himself between the profession that he loves and the invading power, nor time, nor discouragements, nor the seductive allurements of material settlement out of court has been able to affect his noble stand. Such a man, as old Horace says, "has built himself a monument more lasting than brass, which neither time nor the corroding elements can ever destroy."

I am quite aware of the fact that many among those dentists who are opposed to the principle of patenting instruments and methods see an extenuation in the first case which is lacking in the second. Of course when a man comes into the office and offers for so much to show how to do so and so, any well principled dentist, be he ever so saintly, feels like indulging in a little muscular Christianity for the sake of a good cause and introducing that brazen applicant to a taste of strenuous life which would land him suddenly on the other side of the office door. This glaring case of barter, this undignified peddling has no possible excuse and needs no further discussion.

But the man who patents an instrument says, "A patent preserves the purity of make of my invention. Without it there can be any cheap or faulty imitation, which in some cases could work great harm to the profession." That at first seems an exceedingly proper contention. It is necessary that a creation which is the outcome of labor, mental and physical, should not be tampered with and that its integrity be kept intact. This, that it may best perform the work for which it was formed, and, too, in strict justice to the maker. If this integrity can *only* be preserved by a patent, then a patent by all means. But *is* the patent the sole shield to the inventor in such a case? By no means. Every dentist knows, or should know, that the publishing of a new instrument in the records of any society in the presence of a third party saves the instrument to the inventor. With such means of protection available, one must reasonably believe that the man who patents does so not for protection but for profit and for profit only.

Then again, even if we granted that patenting is absolutely necessary to prevent change in make of instruments, whatever benefit is gained thereby is surely more than balanced by a possible harm which restriction may work. Patents stop the pro-

gressive movement of improvements, and if all inventors had used them the profession would have been deprived of much excellence on its mechanical side. For it is out of the labors of many minds that the very best finally appears. Hardly ever does one mind conceive all the probabilities of the thing conceived, but it is out of the added thought and improvement suggested by the experience of one here and one there that final excellence is attained. Patents, in their selfishness, would stop all this, and halt with greedy hand possible progress in the profession.

Then again, many patents are taken out, not to protect a device, but to prevent its manufacture. This, as you know, is not to protect the profession in any way, but in order that the sale of some device already on the market may not be affected. You can easily call to mind a number of things which you cannot procure, simply because the manufacturer will not put them on the market or allow others to do so. Think of Darwin or Agassiz or Roentgen holding back any discovery or book in order that some previous thing may first be disposed of!

I believe that in the past, dentists who patented sincerely thought they were benefiting the profession, and at the same time thought it but fair that they should seek to get some remuneration for the time and money spent in making the device. Many have, by experience, seen the error of this course. Several years back (1889) at a meeting of the New York Odontological Society, while this subject was under discussion, Dr. S. G. Perry, inventor and patentee of separator and engine, said: "I have never received a penny for it, except for the transfer of the patents; and, gentlemen, it is the regret of my life that I ever took a penny for it. I would give a great deal to-day if I had never taken the patent for either the engine or the separators. I did not appreciate then, as I do to-day, the danger to our profession from this mania of taking patents."

Such testimony, and doubtless there are many who are in the same class with Dr. Perry, is valuable as coming—not from the theorizer who has nothing at stake and pleases himself with the utterance of glittering generalities, but from one who, out of the fullness of actual experience, places himself against the

restricting patent on a high plane of ethics which a patentee never can reach.

For, after the last analysis, it is the welfare and future of our profession to which all individual interests should subserve. "Men may come and men may go," but the profession, like the brook, goes on forever. The individual with his ideas and acts is important just in proportion to strength and uplift which those ideas and acts give to the onward movement of the group of which he is one. The soul that feels its individual responsibility to the sum total of life can feel no greater happiness than in the thought that the world has been made a little better because it has sojourned here a while. The professional man with the genuine scientific spirit can have no greater reward than that his profession has pushed an inch forward because he has helped. We work in the present, but it is the future for which we build. "Projected efficiency," let them sneer who will, is the keynote of all existence. This is the principle, whether advanced or not, which has enabled us to fall heirs to so much that is great and good. It must be our greatest pride, then, to pass on to those who come after gifts that have increased in value under our conscientious care. This subject of patents has vexed and retarded our profession long enough; can we not in these first years of a new century with one united effort bravely face it and finally settle it. This is my earnest appeal to-day, for I am truly convinced that not until we do this can we really claim the professional level to which dentistry lays claim.

(NOTE.—This paper having created a general discussion at the meeting, those who are interested in reading the paper in full with the discussion will find the same in the proceedings of the Illinois State Society.—EDITOR.)

PORCELAIN INLAYS AND RESTORATIONS.

BY W. T. REEVES, D. D. S., CHICAGO, ILL.

(*Abstract of paper read before the Iowa State Dental Society, May* 6-8, 1902.)

In presenting this paper for your consideration I have given it the title of "Porcelain Inlays and Restorations," and shall treat the subject in a general way, leaving the details of the technique of the work to be brought out in the discussion.

The subject of "Porcelain Inlays and Restorations" is one that is interesting the Profession very generally, and deservedly so.

There has been a great deal written and said on the subject that it would have been better if it had not been. The old saying that "A little knowledge is a dangerous thing" was never more true than in the case of Porcelain work in all its branches.

Too many have thought that all that was necessary was a furnace of some kind to bake in, and a few bottles of body to work with, in order to do all kinds of porcelain work, and have gone to the chair and essayed to do a practical case the first thing only to meet with a lamentable failure, and then to charge the result up to porcelain and not to their lack of knowledge of the subject. Others meeting with a first success have gone on and attempted what, for them, through lack of knowledge, was the impossible, only to meet with mortifying failure before their patient and to become so thoroughly discouraged as to abandon the work entirely.

All who start to do porcelain work should begin by doing careful experimental work on dummies in the laboratory, carefully tabulating what they observe in a baking, and compare with what they see in subsequent bakings and thus learn by observation when porcelain is properly "biscuited" and properly glazed, and to know this, for porcelain over fused loses all its good qualities and results in failures.

There is no material that is so good a servant when properly and intelligently handled or will stand so little abuse as porcelain. Porcelain as a material used in dentistry is old, but the material and art of to-day is new; in fact the past five years cover its evolution and development. Previous to five years ago manufacturers were only compounding a material that was best suited for their use, namely, tooth manufacturing and, incidentally, continuous gum cases. This material was excellent for the purposes it was intended for, but was too hard to handle for small individual work.

The pioneers in modern porcelain work, knew only too well the difficulties they had to contend with, in the materials they had at their command, And it was only by ceaseless effort, and an increasing demand, that the manufacturers went to work and, through a series of experiments to see what grade of porcelain would give the best practical results, (strength, density, translucency and fixity of color being the qualities desired), was the material of to-day brought forth, and I think there is hardly anything more to be desired as far as material to work with.

Now, I don't want to seem to hold out any discouragements, for in fact I want to enthuse you all so that you will become successful inlay workers, for to be successful will make you enthusiastic and to be successful you must be master of your materials and the technique of the work.

What are the qualities to be desired in a material to replace lost tooth substance? I will name as of first importance, Durability; second, Compatibility; third, Availability; fourth, Practicability, and last, Esthetic. Under these headings I think can be catalogued all the qualities desirable in the ideal material to replace lost tooth structure, and I know of no material that will come so near filling all requirements as will porcelain used as inlays.

Durability—This will come very near covering all the ground, for any cause that detracts from durability is chargeable up against the material used. Permanency of the operation to be performed is always desired and, heretofore, gold has been the sheet anchor of the American dentist for the permanency of his operation; we all know how short lived the average gold filling of to-day is. The average life of a gold filling is placed at from three to five years. Why this lamentable condition? Imperfect conception of cavity formation, imperfect condensation of gold, and imperfect finishing of the filling—any one of these three will result in failure.

It is this condition that has brought out so much in writings and discussions in the past few years on "Extension for prevention," and "Contour." We all know how few operators there

are who are putting in ideal gold fillings as to cavity formation, contour, condensation and finish, and in comparison I will only cite these operations and exclude the medium and poor gold fillings.

I will state here, lest some may think that only the simpler cavities are intended for comparison, that I restore with porcelain the most extensive cavities in bicuspids and molars. How often there is failure of a perfect piece of work because the tooth would not stand the stress of mastication and the filling broke out, there being no decay to cause such breaking. A porcelain in such a tooth would have strengthened, instead of weakened it.

Again, how often following the most perfect operation is there recurrency of decay; here again a porcelain restoration will do its best service. It is an unaccountable fact, but the clinical experience of all inlay workers of any considerable period of time is that there is seldom, or never, any recurrency of decay around inlays. In a period extending over ten years I have yet to have the first case of recurrence of decay around an inlay.

These two conditions are arguments enough in favor of porcelain as a filling material. I will cite results of the two kinds of work by one operator who died several years ago, a dentist whom you all know; whose reputation extended beyond his own city and state; was considered a good operator; invented and made gold inlays. It is but fair to presume that the workmanship of his inlays was no better than his fillings. The dentist who was with him and succeeded to his practice is an intimate friend of mine and has retained practically all of the patients of his former associate and has thus had a good opportunity to observe the results. He told me, less than a year ago, that the only work standing to-day, of the old doctor's, was the gold inlays he put in, some of which had been in twelve, fifteen or eighteen years.

Compatibility—We all know how many cases come to us in which we would not dare to put a metallic filling, for we know that the pulp would be almost sure to die under the filling. We do one of two things, temporize or devitalize. If we temporize

it is pulp capping, cement filling, or what not—at best we are only putting off the evil day. If we devitalize, what an amount of good, sound dentine we often have to cut away in order to gain access to root canals, and consequent weakening of the tooth.

In those that are desperate cases, you can make and set a porcelain inlay with the consciousness that you have restored the tooth to its full usefulness with no fear of the death of the pulp or that it will become necessary to open into and devitalize on account of pulp irritation, for it has become a well-established fact, through clinical observation, that porcelain is the best non-conductor of thermal changes of any material we have ever used.

Teeth with sensitive cavities at the gum margin, or extensive cavities, that, filled either with cement or gold, were an annoyance to the patient—not enough to endanger the pulp, but just enough that the patient was always conscious of that tooth and wanted something done, have, on removal of these fillings and replacing with porcelain inlays, become perfectly normal, the patient losing all consciousness of having that tooth in his head.

Availability—What filling material have we for any given case? What are you going to do with those high-strung, nervous temperaments to whom it is a physical impossibility to sit in the chair and have a cavity prepared for a gold filling or even a cement filling? In these cases porcelain inlays are a boon to both patient and operator, for with it you can do good, permanent work, for there is no material we use for the reception of which the cavity can be prepared with as little discomfort to the patient as for the insertion of a porcelain inlay. There is no necessity of extension for prevention, or no undercuts to be made.

Again, with those patients where you have gone ahead and prepared a cavity after a fashion, and put in a gold filling, knowing all the time that you have not done justice to yourself and, that, sooner or later, the operation will fail and that the second condition will be worse that the first. You excuse yourself on the ground that you did the best that you could under the circumstances. Probably you did as well as anyone could have done under the same conditions, but with porcelain you could have put in a perfect filling with satisfaction to yourself and to

the patient. The foregoing class of patients will appreciate the comfort of the operation more than any others.

Again, in the teeth of children from eight to ten years and on through the years of development up to sixteen and eighteen years of age, in whose teeth it would be almost criminal to put gold fillings and where cement wears away so fast as to be dangerous, you can do permanent work with porcelain inlays.

Again, those teeth so badly broken down that there is not tooth substance enough to enable you to cut retention, that will hold a material filling, and are condemned, to be crowned as a last resort, can be saved for a good many years of useful service, with an inlay, thus putting off the evil day.

Practicability—Is it practical to make porcelain inlays? I think that all operations that result to the good of the patient and can be performed with the minimum amount of taxation upon both patient and operator are practical, and any operation that is practical will rceive remuneration just in proportion that it is practical.

The making of porcelain inlays has been a slow and steady growth, until now it is the major portion of my work. No one would jeopardize a good practice by jumping into something unknown, and it has only been as the years have proven the many good qualities of the porcelain inlay that it has become almost exclusive with me as compared with gold.

In answer to the question of a dentist who was taking a course of instruction in inlay work at my office during the last week in April—as to how many gold fillings I put in—I went over my day book as far back as the first of December, of last year, and I had put in just three gold fillings in that time. It was a surprise to me. I knew I was not putting in many gold fillings but I did not think it so few as that.

I assure you that of all the work I do, inlays are the most satisfactory, both to myself and the patient.

Esthetic—Here porcelain inlays are so far above and beyond all other materials as to have no competition. The majority of dentists will place the esthetic feature first in naming the points of porcelain as a filling material, but I place it last, for I consider it is the dentist's first duty to serve his patient in all that he does in a way that is for the best good of the patient, and, second, to

do it in a way that will be the least objectionable. We are all so used to seeing extensive display of gold in the front teeth that I don't think we appreciate its ugliness, nor can we appreciate the ever conscious annoyance of a refined, sensitive nature who has the misfortune to have an extensive display of gold in the front teeth. I could cite you cases by the score but will only tell of one. A young lady, who now resides in San Francisco, had two mesial approximal cavities in the superior central incisors filled with gold, in an otherwise perfect set of teeth, was so self-conscious of those fillings that she was forming the habit of keeping the lip down and drawn while talking or laughing, and it was giving her a very unnatural expression. Finally, they became such an annoyance that she went to her dentist, determined to have them replaced with something less objectionable. The dentist knew that porcelain inlays were made and was what ought to be placed there, and as he did not do that work, sent her to me and I replaced the gold fillings with porcelain inlays. That was over three years ago. When the inlays were set, she was extremely pleased. A month after they were in she wrote me a note to tell me what a source of comfort they were and to say that she had become entirely unconscious of her teeth. Last January I received a letter from her, from San Francisco, saying she wanted to thank me again—that the inlays were just as perfect as the day they were put in—also, that her friends would not believe her when she told them that she had two fillings in her front teeth. This is not an isolated case, but is only one of many I could tell you. There is no work I do that the appreciation of the patient is so openly expressed as in inlay work, and the appreciation of the work you do goes a long way towards stimulating one to do his best.

There is so much I could say under all of these headings that it has been hard to condense down to the limitation of a paper—any one of them would give "subject matter" enough for a paper by itself.

So far all inlay workers will indorse what I have said fully, or in part, just in proportion as they have had experience in inlay work; but now we come to the forking of the road.

Some travel the high fusing way and some the low fusing. I am first, last and all the time for high fusing bodies, i. e.,

bodies that fuse above the temperature of 1840° F., or the melting point of gold. The division seems to be a geographical one also, for the great majority of the eastern inlay workers are followers of the Jenkins methods and users of the Jenkins bodies, while in the West they are almost exclusively workers of high-fusing bodies. The one great point the Jenkins followers make, and about the only one they have a shadow of a chance to, is the greater ease with which gold can be burnished into a cavity to form a matrix, but the greater ease and safety with which a platinum matrix can be handled afterward more than counterbalances, both in time saved and in accuracy of results obtained over gold. I know of no cavity in which gold could be burnished that platinum could not be burnished better, and I can call to mind several in which, if gold were used, it would have been so distorted in removal from the cavity as to be useless as a matrix.

The technique of burnishing platinum into a cavity to form a matrix is simple and it is possible for everyone to attain proficiency in this part of the work, such as to insure an absolute fit of the inlay. I divide the burnishing into four stages, every one of which must be completed before proceeding to the next and the end will be a perfect matrix. I will not take the time here to describe my method. In passing I will say that I consider the time taken to take an impression and run up a model is so much time wasted, for great deal better results can be obtained by burnishing directly into the cavity, on an average. I will burnish a matrix from start to finish in from fifteen to twenty minutes, and it would take anyone about that long to get their material ready, lute the cavity, and take an impression that would be worth anything, and then they have to run up the model and burnish the matrix after that, which precludes the possibility of finishing an inlay at that sitting.

The qualities one must have to be a successful inlay worker are two-fold—mechanical, artistic—and delicacy of manipulation in both. The first we have touched upon in matrix formation; the second comes in the handling of bodies so as to produce a perfect match of inlay to tooth.

Theories become principles, when time proves their truth, or when clinical practice demonstrates their soundness.

It has been the almost universal practice of inlay workers to select a body by their shade guide that seems to be a perfect match to the tooth, or to change it by adding a little of this and that body and baking the inlay all of the one body or mixture. When I first began to make inlays it was a theory of mine that bodies should be handled in a different manner. I am now preaching that theory as a principle and I have an ever-increasing following and in time I believe it will be generally accepted as a true principle in all porcelain work.

Let me quote the superintendent of the porcelain department of a prominent dental supply company, when he visited several Chicago dentists about two years ago to confer with them and ascertain what they wanted in porcelain for crown and inlay work. The appointment was made with me for the superintendent by the manager of the Chicago house, and he spent several hours at my office. We went over the whole subject of bodies and I told him what I wanted and why. He said, "Dr. Reeves, you are the first one I have ever heard advance those theories, but I believe you have the true scientific principle of working porcelain." It has always been a theory of mine that to obtain a true color and the translucency that is so desirable, that inlays must be built up in layers, modifying the color by allowing it to reflect through an overlaying color, each layer being baked by itself. I have some samples and inlays that I shall show you that I think will prove beyond all question the correctness of this theory. In this way you can vary the shade of an inlay so that you can match all the shades of the tooth, from the neck to the cutting edge, also you can obtain those steel blue tinges and the discolored effects that have been so impossible heretofore. Now you can only obtain these effects with the high-fusing bodies—low-fusing bodies lack translucency and it is impossible to handle them in this way.

I believe more true artistic ability will be cultivated by noting what degree of color is obtained by the thickness of the layer of body put on, and the extent it is modified by the overlaying bodies, than by any other method, for you can reproduce to-morrow what you did to-day, and you could never mix bodies together in small quantities twice alike.

This brings us up to the method of selecting the colors your inlay is to be, and here I want to bring before you a new principle in color selecting. It is the general practice to select the color as you would the facing for a crown. A person might select a facing that, placed between two natural teeth, could not be detected; but if a corner of that facing was joined to a corner of either adjoining tooth, it would not match at all. Why? Because each tooth has different underlying colors. The facing was perfect for general effect, but the corner of either adjoining tooth has different underlying colors. It is underlying colors you want to look for. It will surprise you when you look at a tooth in this way what a different lot of colors you will see, and it is just in proportion as you are able to see these underlying colors, and are then able to reproduce them in your inlay, that you will be successful. It will surprise you when you look at what you would say was a typical light yellow tooth, to see that there is either a gray or blue tinge down inside that tooth. You want those same colors in your inlay or it will not be a perfect match. Now I use the shade guide, not to get a match for the tooth, but to help me in looking for the underlying colors and the degree of those colors.

I want to call your attention to the possibilities there are in the use of what I call primary colors. They are as deep as the colors on this card; they are high-fusing bodies and not paints, but they must be used like paints would be, by putting them on mixed with oil, for you can not put them on thin enough or smooth enough mixed with water, as you do ordinary bodies. These are a set of colors that was made for me by Mr. Brewster, of Chicago, and is meeting a long-felt want. Their use is not confined to inlays, but can be used to artistically change facings and teeth for all kinds of artificial dentures.

One more theory I want to offer you. There are those today, who are baking into inlays (that are extensive restorations of corners, etc.), platinum pins and loops, for the purpose of retention. I have passed through all these different stages in the evolution of inlays. It was in '96 or '97 that I discarded everything of that nature in extensive restorations, and about three years ago that I left off undercutting cavity or inlay. I believe inlays are retained by close adaptation and the cement setting

under pressure on exactly the same principle as a joiner joins two pieces of wood. He prepares the surfaces to be joined so that they are in perfect adaptation to each other and placing glue on those surfaces places it in a vice, or clamps them together under as much pressure as he can until practically all the glue is squeezed out and leaves it to harden, and the less glue there is the stronger the joint. That I believe is the true principle upon which inlays depend for their strength of retention. When an inlay breaks out of a cavity, you will observe that the cement remains in the cavity and the inlay comes away clean, showing that the glazed surface of the inlay is not conducive to retention. It was formerly my practice to score the reverse side of the inlay with a knife-edge carborundum wheel, removing as much of the glaze as possible; but often inlays were of such size and shape as to make this extremely difficult. It has become my practice, for some time, to etch the reverse side of all inlays with hydrofluoric acid. This removes all the glaze, leaving a roughened surface; but does not alter the close adaptation the inlay must have for the interior of the cavity as well as at the margins.

We are now up to the fee and I will leave that for each of you to adjust as his conscience dictates.

(The subject of Porcelain Inlays will be continued in each issue of the AMERICAN DENTAL JOURNAL, taking up the work in every detail.)

WHAT CHEMICAL INFLUENCE HAS SALIVA ON CEMENT?

BY J. E. HINKINS, D. D. S., CHICAGO, ILL.

(Abstract of paper read before the Odontological Society of New York, January, 1902.)

In my paper on "The Disintegration of Cement Fillings," before the International Dental Congress at Paris, I had the honor to discuss with my colleagues the two distinct actions on cement, viz.: The mechanical attrition and the dissolution under the free margin of the gum, thus giving the various cements as they have been propagated by their inventors from 1870 to the present day.

To those who have read this paper, it will be remembered that I brought to your minds that by actual test I had performed, that where these cements were chemically pure and mixed in the right proportion there was but slight disintegration. I had found by chemical test in several mixes, as would be used in office practice, that where cements were mixed, as would be the case in the setting of crowns and bridges, that on the setting of the cements there was an excess of phosphoric acid, and to that degree made this soluble, but in the case of mixing for a filling there was an excess, in the setting of the cement, of oxide of zinc, making the filling more soluble.

I also demonstrated that when there had been disintegration of the cement under the free gum margin, there was found to by an acic condition. Whether this condition was due to fermentation or bacteria we had not at that time demonstrated, but it was with the view of solving this problem that the experiments were performed with the saliva, and our deduction given in the paper which is to follow.

The purpose was, first, to determine the composition of cements; second, to determine the amount of acid or alkali formed by common bacteria of the mouth; third and last, to see if those acids or alkalies will dissolve or injure cement. The question now arises, what chemicals are contained in saliva that will influence the cement? We will therefore review the literature of the various analyses and constituent elements of saliva.

Saliva is secreted by several glands situated in the mouth, and represents in its mixed condition a viscid, generally slightly alkaline, tasteless, inodorous liquid of a specific gravity of 1.002 to 1.008. It contains:

Water	99.49 per cent
Ptyalin	0.12 per cent
Epithelium and mucin	0.13 per cent
Fatty matters	0.11 per cent
Salts	0.15 per cent

Ptyalin, the active principle of saliva, is a ferment which has the power of converting starch into maltose and small quantities of dextrose. Intermediary between the starch and sugar are two products known as erythrodextrin and achroodextrin. Starch is recognized by a deep blue color produced by a solution

of iodine and potassium iodide in water. Erythrodextrin gives a mahogany brown or violet color, and achroodextrin, maltose or dextrose do not color the iodide solution at all. The composition of ptyalin is doubtful. Among the various salts of saliva is found potassium sulphocyanate, as may be shown by the addition of a drop of ferric chloride solution, which produces a deep red color, disappearing on the addition of mercuric chloride (difference from meconic acid).

The quantity secreted daily by a man varies considerably; estimates varying between 13 oz. and 3½ lbs. have been given; 500 to 800 grammes is another estimate. Its alkalinity averages in man .08 per cent expressed as sodium carbonate.

The constituents of saliva are:

Organic (a) Mucin.—Acetic acid precipitates this in a stringy form.

(b) Ptyalin, an amylolytic ferment discovered by Leuchs in 1831.

(c) Proteid: a trace of a proteid, coagulable by heat of the nature of a globulin, is constantly present.

(d) Sulphocyanide of potassium (KSCN) is usually but not always present in human saliva.

Inorganic.—Small quantities of chlorine and phosphoric acid in combination with potassium, sodium, calcium and magnesium; also small quantities of sodium carbonate.

Sodium chloride is the most abundant salt. Schonbein observed that saliva contains a substance which, like nitrous acid, colors blue a mixture of starch and potassium iodide.

According to Hammarsten, the cells of the submaxillary gland contain proteids, of which the most abundant is a nucleoalbumin; they also contain mucin, which passes into the saliva. The sublingual is similar. The parotid cells contain no mucin. A small amount of mucin is, however, obtainable from the investing connective tissue.

In myx-oedema the parotid cells, however, undergo mucoid degeneration. An extract of salivary glands exerts a similar diastatic power to that of saliva, as it contains ptyalin.

Hammersbacher found in 1000 parts of the ash from human saliva, potash 457.2, soda 95.9, iron oxide 50.11, magnesia 1.55,

sulphuric anhydride (SO_3) 63.8, phosphoric anhydride (P_2O_5) 188.48 and chlorine 183.52.

According to Erik Muller, who made extensive investigation of the salivary glands, saliva is formed from typical intracellular granules. He gives the following results of his investigations:

1. The saliva is a product of granules which undergo characteristic transformations.

2. The secretion is present in the gland cells in the form of small round vacuoles, which are separated from the surrounding protoplasm by a wall which can be stained. These vacuoles were first demonstrated by Retzius in Golgi preparations and by the author in ordinary preparations.

3. These vacuoles are formed in granules in cells.

4. The cells have a different appearance, depending upon their richness in granules; some of them have large clear granules, separated from one another by a reticulum containing small granules that take the stain; other cells have large granules that can be stained.

5. During very active secretion the granules which can be stained become changed into secretory vacuoles.

6. The secretory capillaries of albuminous glands are all intercellular.

Chittenden and Richards, in a study on variations in the amylolytic power and chemical composition of human mixed saliva, give the following summary of some of their results: "Human mixed saliva contains normally no sodium carbonate whatever; the alkalidity indicated by litmus, lacmoid, etc., is due to hydrogen alkali phosphate with possibly some alkali bicarbonate. Mixed saliva invariably reacts acid to phenolphthalein.

The alkalinity of mixed saliva as indicated by lacmoid is greater before breakfast than after the morning meal; a conclusion which stands in direct opposition to the statement frequently made that the alkalinity (of mixed saliva) is least when fasting, as in the morning before breakfast, and reaches its maximum with the height of secretion during or immediately after eating. Saliva secreted after a period of glandular inactivity, as before breakfast, manifests greater amylolytic power than the secretion obtained after eating, as observed by Hofbauer. Corresponding with this increase in amylolytic power occurs an

increase in the proportion of alkaline-reacting salts, but the increased amylolysis is due primarily to an increase in the amount of active enzyme contained in the saliva.

Mixed saliva, whether collected by mechanical stimulation or collected without effort, shows a natural tendency to vary both in composition and in amylolytic power throughout the twenty-four hours and apparently independent of the taking of food. Between 7:00 and 11:00 a. m., however, in the absence of food, the secretion is remarkably constant.

Mechanical stimulation, as chewing a tasteless substance, and alcohol, ether, gin, whisky, etc., taken into the mouth, all lead to the outpouring of a secretion richer in alkaline-reacting salts and in amylolytic power than the secretion coming without stimulation.

Mixed saliva resulting from stimulation with ether, alcohol, etc., contains a much larger proportion of mucin than the secretion coming without stimulation, being noticeably thick and viscid. This quality is not apparent in the saliva resulting from mechanical stimulation.

Greenbaum investigated the effect of resistance to secretion upon the percentage of salts in saliva, and upon the work done by the gland and concludes as follows: "In normal circumstances, the percentage of salts in saliva varies with the rate of secretion, increasing as the rate increases and decreasing as the rate decreases." In his experiments he found that when a decrease in the rate of secretion is effected by offering resistance to the flow of saliva, the percentage of salts in the saliva never decreases proportionately and may actually increase.

He states that the increase of percentage of salts cannot be attributed to a filtration through the walls of the ductules and ducts, since this process, even if it could effect the percentage of salts at all, would necessarily cause a greater increase in the percentage of organic substance. His experiments show that there is no necessary connection between the increase in the percentage of salts and the increase in the percentage of organic substance.

An experiment was made to determine approximately to what extent the viscosity varies with the percentage of organic solids. A number of specimens of saliva were collected and

forced through a capillary tube under a pressure of 10 cm. Hg. Time and quantity were observed and comparison made with distilled water, the viscosity of which was taken as a unity. The result was that the viscosity varied with the percentage of salts. M. Cohen made investigation of the saliva and reports the following results: He found many indicators useless in measuring the alkalinity because of the large amount of CO_2 in the saliva. Methyl-orange proved to be the most satisfactory, and this gave reliable results. The average alkalinity of the saliva corresponded to a solution of sodium hydrate of a strength of 0.0154 per cent, although it varied considerably. Cohen is of the opinion that the figures given by earlier authors for the alkalinity have been too high. He found the alkalinity greatest in the morning when the stomach was empty; it decreased in the forenoon, increased again at noon and reached its highest point at this stage. It then decreased again in the afternoon and increased toward the time of the evening meal. He never found the reaction acid in normal persons.

Cohen calls attention to the fact that the saliva has frequently been found acid in infants and in adults who are the subjects of diabetes or of diseases of the mouth, esophagus or stomach. He observed no relation between the acidity of the stomach contents and the alkalinity of the saliva.

Cohen observed some instances of paralytic sialorrhea and the saliva of patients who had received pilocarpin and found an unusually high degree of alkalinity; the freezing point of the saliva in these cases was somewhat more reduced than in normal cases.

Many experimenters have tried to cause absorption of blood exudates or of metabolism products in cases such as pleural effusion and in nephritis. Cohen likewise attempted it, but without definite results. He was unable to observe any marked change in the alkalinity or in the molecular concentration, though the amount of chlorides seemed to be increased. In two instances of chronic parenchymatous nephritis, however, he found the molecular concentration high as indicated by the lowering of the freezing point.

F. Kubel brings forth evidence which tends to upset the current doctrine that ptyalin acts best in a neutral or weakly

alkaline medium. On the contrary, he finds that even the weakest alkaline reaction hinders it, while a weak acid reaction is highly favorable, especially when the acidity is due to some of the stronger acids, such as HCL. An amount of HCL equal to that in the gastric juice brings the activity of the ptyalin to an end.

According to Kruger, thiocyanic acid is a constant and normal constituent of human saliva; it does not result from a partial decomposition of the saliva or from carious teeth. The saliva of smokers was found to contain two or three times as much of the acid as that of non-smokers. The quantity of saliva secreted in twenty-four hours (250 to 300 c. c.) was not markedly influenced by cigarette-smoking.

There is no doubt that there are some ingredients contained in saliva that may have influence on the general economy of the human system; if not from the acidity or alkalinity, it may be from a toxicity as per example, the experiments of Pignatti, Morano and Baccarani, who tested the toxicity of saliva from healthy and diseased human beings on rabbits. They found that the saliva was toxic in doses of 20.738 c.c. per kilo of animal. The toxicity varied with individuals within wide limits and seemed to have very little relation to health or disease. There was also no relation to be found between the toxicity, the specific gravity, the degree of alkalinity, or the quantity of ptyalin or mucin. The animals generally died in convulsions.

Again, other authors claim to the contrary, that there is nothing in the ingredients of saliva that would be derogatory to the general health, or to the oral organs. Sanarelli, for instance, states that considering the frequent presence of pathogenic micro-organisms in the mouth, it is remarkable that primary lesions appear so rarely, and that wounds heal so kindly there, and sums up by saying that the saliva is an unfavorable medium for certain pathogenic bacteria, destroying them, when not too abundant, more or less rapidly, and so altering the type of others —for example, the pneumo-bacillus—as to render them harmless.

Hugenschmidt made investigation of the antiseptic properties of saliva in order to determine why mouth operations are seldom followed by infection. He found that ordinary micro-

organisms grow rapidly in the saliva, but that nevertheless, this fluid does have a tendency to keep down infection. Being alkaline, it thus prevents fermentation. It washes away considerable portions of food which tend to lodge on the mucous membrane and dilutes that which remains. Hugenschmidt maintains that saliva stimulates the diapedesis of the white blood corpuscles in the lymphatics. Even normal saliva contains microbic products, and therefore because of its attractive power toward microbes favors phagocytic action, the phagocytosis being due to rapid migration of the leucocytes.

We have hereto fairly well reviewed the pathological physiology and the chemical action of saliva upon the economy of the human system, including the maxillary glands, but now, what effect can the ingredients of the secretive oral organs have on cement, or in other words, what chemical changes take place when the ingredients of saliva are combined or connected with the ingredients of cement? We will therefore review the contents or the chemicals contained in cement.

The principal chemical constituents of cement I find, are phosphoric acid, phosphate of alumina, nitric acid, phosphorus, sodium phosphate, zinc oxide, silicate of alumina, magnesium oxide, bacic zinc oxide, zinc oxychlorid, zinc oxyphosphate and zinc oxysulphate, arsenic, antimony, lithium phosphate, borax, boric acid, calcium pyrophosphate, cadimum sulfid, fluorhydric acid, sodium carbonate, powdered glass, silex and water-glass, sodium borate, magnesium nitrate.

I must confess that I am unable to see that there is anything in the combination of the constituent elements of saliva and cements that would be derogatory to each other, if no other element comes in contact with them. But there is an element that comes in contact with them that is a phenomenon to me and which I am unable to explain. That is, I observed that chemical changes take place during the various periods of female life. I find that the saliva of young girls, before they mature, is of lower specific gravity and varies from that in those who are menstruant; and that the saliva in women who have passed menstrual life returns to the same nature as that found in young girls. From this, it is evident that the organs of generation influence the circulatory organs, hence the saliva. Another observa-

tion which I have made, and which undoubtedly is not new, is the chemical changes that take place in the saliva while operating on the teeth. We find that the saliva changes its chemical constituents while the mouth is open. This possibly may be due to the atmospheric elements of the room or to inhalation of exorbitant carbonic acid gas.

We also find an increase of from 3 to 7 per cent in the acidity of saliva after a large gold filling or any other operation, when the constitution of the patient is taxed to any extent (figured on the basis of 1-10 normal sodium hydrate.)

Now to the point, if such morbid changes take place in the chemical constitution of the saliva, from whatever cause it may be, why can not the same influence produce chemical changes in cement? Therefore, it is my opinion that if any derogatory chemical influence takes place in cement, it is produced by the same action and the same cause as in saliva.

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PHYSICAL DIAGNOSIS.

From a lecture delivered before the Senior Class at the Chicago College of Dental Surgery, October 16, 1901.

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From a dental standpoint the subject of Physical Diagnosis is new. During the past year the State Board of Dental Exam-

iners in a number of states have placed the branch of Physical Diagnosis among the studies which must be passed to secure a license to practice dentistry in their respective states.

Heretofore the subject of Physical Diagnosis has been taught in our dental colleges in part by several chairs, the subject, however, being only partially covered, barely enough being given to enable the men to pass the State Board of Dental Examiners, and on one or two occasions it was the only branch in which graduates failed to pass the state examinations. For that reason it has been made a permanent chair in some of our dental colleges.

With the advance of civilization man has steadily increasd in knowledge. Scientific investigation has brought man to a higher plain, broadened his mind and ripened it in the fields of research. Our great men of the past have been those who were never tiring in the promotion of their profession and the uplifting of their fellow men.

In searching the catacombs of Rome and Naples, teeth have been found which were filled with small pieces of wood and ivory, assuring us that the art of preserving teeth was known to our ancestors, centuries ago. Unfortunately the written records of this work have been lost, and who the great dentists of that age were, no one knows. Had these men been satisfied with their work and their patients pleased and contented with such fillings dentistry never would have gained the high place it has reached in the professional world.

Dissatisfaction with prevailing methods and the desire to excel set men to thinking and doing, until dentistry has developed from a humble trade to an honored profession, now affording occupation for thousands of men, and whereby the sufferings of the entire civilized world can, to a certain extent, be relieved.

All professional schools have, in the last few years, lengthened their course of study. It is but a short time since a medical student could graduate in medicine after attending two courses of lectures of six months each; now he is required to attend four years of nine months each, after having a good scientific or classical education, as a foundation upon which to build his pro-

fessional knowledge; thus requiring from six to eight years of college work to receive the degree of Doctor of Medicine. Dentistry has not been found napping all this time; the requirements for admission to a dental college are yearly increasing, as well as the course lengthening and the number of branches studied increasing.

A few years ago a student received a few lectures on Physiology, when that part of his course was completed; nowadays it is one of the most important branches he has. Histology and pathology have recently become important subjects, and the dentist must also have a knowledge of anaesthesia and oral surgery. Further, the amount of operative work that must be done in the infirmary has been more than doubled. All this has been done to broaden his knowledge and place him on a higher level with mankind, as well as to enable him to better satisfy himself and his patients after launching out in his chosen profession.

The dentist as a professional man is called upon from time to time to give his opinion as to the etiology and prognosis of certain diseases, and this he must be able and willing to do, and be correct in his diagnosis. At times this will be easy, again he must tax to the utmost his knowledge and reason before a definite statement can be made.

It will not always be an easy matter to tell just how much vitality a patient has or how much of a nervous shock he can endure, nor how long he can remain in a dental chair at one time without sustaining material injury. This the dentist must know, so that patients upon leaving the office, will have received professional benefit instead of injury.

I have seen neurotic patients that were nervous wrecks for days after the completion of a large amount of dental work. A little forethought and judicious thinking on the part of the dentist could have avoided this. A few more calls of shorter duration would have finished the work, at the same time acting as a stimulus instead of a nervous shock. This knowledge can be attained only by a thorough study of patients and an understanding of their cause and complaints. The time will soon come when a dentist will inquire into the health and symptoms of his patients before prescribing the amount of work that should be done, the same as a physician gathers facts before prescribing

the amount of a certain drug that should be given for certain ailments.

To judiciously outline his work the dentist must, therefore. have a thorough knowledge of the various diseases of mankind, their symptoms, and the pathological changes that result. A victim of organic heart disease should not be kept in the chairs for hours, if the dentist was informed as to his condition.

There is only one way for a dentist to gain this knowledge, and that is for him to be familiar with the normal heart, as to location, size, beat rhythm and sounds, thus enabling him to recognize pathological conditions. How embarrassing it must be for a dentist, after advising the administration of a general or local anaesthetic, to learn, upon consulting the family physician, that such a procedure would mean death to the patient.

When this knowledge is acquired and practiced he will gain the explicit confidence of his patients, with them his word will be law, his opinion will be sought and valued, and thus will he become a further benefactor to his community.

At times it will be impossible to obtain a complete history of the case on account of the timidity or forgetfulness of the patient, or very often a fear of divulging family secrets, hereditary or acquired specific diseases. With these cases one must proceed with caution; a direct question would at once meet the disapproval of the patient and call forth a false answer, at the same time putting them on their guard so as to avoid indirect questions, or, worst of all, arouse suspicion which may lead to domestic unrest and even separation. A little tact will elicit all this knowledge and arouse no suspicion if the dentist is familiar with the symptoms and complications of the malady he is seeking. He must be master of the situation. After listening to the symptoms of patients he should be on the offensive, not the defensive.

The terms used to designate those methods which are employed for detecting disease during life, by the anatomical change which it has produced, is physical diagnosis. The nature and extent of such changes may be recognized and appreciated by the divergence which they cause in the affected organs from the known physical condition of these organs when in health.

The significance of physical signs in disease can be determined, not by theory, but only through clinical observation confirmed by observation after death.

There are six methods of eliciting these physical signs:

(1) Inspection.
(2) Palpation.
(3) Mensuration.
(4) Percussion.
(5) Auscultation.
(6) Radioscopy.

Some of these methods are old. Palpation was used in the Neolithic or polished stone age, 1500 B. C., to elicit fluctuation. Hippocrates observed that a horse which had been shot in the head in the Trojan war by an arrow turned round and round. Morgagne discovered later similar movements in animals with injury of the cerebellum.

Radioscopy is practically new. It is the outcome of the discovery of the X-ray, by which, with the use of fluoroscope, we are now able to locate tumors or solid bodies in different parts of the body that were impossible of discovery before. A fracture of the bone can be definitely located by this means, and the exact kind and position of the fracture may be determined by looking at the bone direct. Foreign bodies can be seen in almost any part of the body, thereby enabling us to diagnose condition of the internal organs, which was impossible before the discovery of the X-ray.

For convenience we have the body divided into certain areas bounded by definite anatomical relations. To know whether an organ is in its proper position and whether it is normal in size, we must know the normal location of the organ.

The figures (1) and (2) present the organs in the normal position. In these figures we find the chest divided off into certain areas.

The first area to be noted is the one above the clavicle, which is called the supra-clavicular region. This region is bounded below by the inner three-fifths of the clavicle, internally by the trachea, and superiorly by a line drawn from the junction of the outer with the middle third of clavicle to the top of the trachea

Normally in this region we find the apex of the lung, we find the carotid artery, the subclavian vein and the jugular vein.

Next below that is the clavicular region, which is that part of the thoracic cavity lying back of the inner three-fifths of the clavicle. In this region we find on both side lung tissues. On the right side we find at the outer extremity the subclavian artery. Near the sterno-clavicular articulation we find the innominate artery. On the left side you will remember that the innominate artery is absent, the subclavian and carotid arteries coming off direct from the aorta; so we have on the left side in the clavicular region the subclavian and carotid arteries.

Now comes the most important regions, from the dental standpoint; first, is the infra-clavicular region, bounded above by the clavicle, internally by the edge of the sternum, inferiorly by the lower border of the third rib, and externally by a line drawn perpendicularly from the junction of the middle with the outer third of the clavicle. In these we find the contents of the cavity materially different on the right and left side. On the right side we find lung tissue, the ascending vena cava, the right bronchial tube lying back of the sterno-costal articulation, and we also find a very small portion of the arch of the aorta. On the left side we find the pulmonary artery from its origin to its bifurcation, the left bronchial tube lying a little below the second sternocostal articulation. Second, the mammary region. This region is bounded above by the third rib, inferiorly by the lower border of the sixth rib, internally by the sternum and externally by a continuation of a line drawn from the infra-clavicular region. On the right side we find the lung tissue coming down to the sixth rib, following the sixth rib down until we come to its lower border; we find a portion of the right auricle and a triangular portion of the right ventricle. The diaphram is pushed up by thte liver till it comes to the fourth rib, so deeply seated do we find the liver. On the left side we have the lung tissue coming down only to the fourth rib, then it goes normally to the left until it strikes the border of the fifth rib, then downward and slightly outward until it reaches the sixth rib. You see a small triangle in this region that is not covered by lung tissue; that is the location of the heart flatness, or where the heart comes the nearest to the surface. We also find in this region a small portion of the right

ventricle and a small portion of the left ventricle and branches from the main bronchi.

The lowest region in the anterior aspect of the thoracic cavity is the inferior mammary, bounded above by the lower border of the sixth rib, internally by the sternum below the line corresponding to the edge of false ribs, externally by continuation of outer border of mammary region. On the right side in a full inspiration we have the upper part a thin layer of lung tissue; in the lower part we have the liver. On the left side in full inspiration at the upper part we have a thin layer of lung tissue and we have the stomach lying deeply, as well as the spleen.

Centrally we have the sternum, and this area is divided into three regions; (1) the supra-sternal, or that region which is above the sternum, properly bounded below by the notch of the sternum, above by the first ring of the trachea, and on either side by the sterno-mastoid muscle. In this region we find at the lower part the arch of the aorta coming just above the upper border of the sternum, the trachea, the oesophagus and the innominate artery. (2) The next region is the upper sternal, which is the part that lies back of the sternum above the lower border of the third rib. In this region we find the ascending and transverse aorta, the pulmonary artery, the bronchial tubes the bronchial glands and the bifurcation of the trachea and the left vena innominate. The lower border corresponds very nearly to the base of the heart. (3) The next region is the lower sternal, and is that part which lies back of the sternum below the lower border of the third rib. In this region we find the right ventricle of the heart, a small portion of the left ventricle, the left lobe of the liver, lung tissue, and a portion of the cardiac end of the stomach, the attachment of the pericardium to the diaphragm, deeply seated, the aorta and oesophagus.

The back is divided into three regions:

The supra-scapular region is that part which lies back of the superior and inferior fossa of the scapula. In this region we find lung tissue.

The infra-scapular region is the part that lies below the scapula. It is bounded internally by the spinous processes of the vetebrae below by the twelfth rib, above by the seventh dorsal vertebra, and externally by the posterior border of the inferior

axillary region. In the posterior portion we find lung tissue coming to the eleventh rib, on the right side of the liver and a small portion of the upper part of the kidney. On the left side we have lung tissue, the cardiac end of the stomach, the upper portion of the left kidney, the spleen and intestines. In dissecting we discover that normally the right kidney is lower than the left, being pushed down by the liver. We have a region between the scapula which is called the interscapular region. It is bounded above by the second dorsal vertebra and below by the seventh, externally by the posterior border of the scapula and in the median line by the spine of the vertebrae. In this region we find from the fourth dorsal vertebra down to the descending aorta, a portion of the oesophagus, some lung tissue, the trachea dividing opposite the third dorsal vertebra into the right and left main bronchial tubes.

We have laterally two regions: The axillary and the infra-axillary regions.

The axillary is that region immediately below the arm-pit, bounded above by the axilla, below by a line drawn from the inferior angle of the scapula to meet the lower border of the mammary region, anteriorly by the external border of the infra-clavicular and mammary regions. In this region we find lung tissue, and, deeply seated, the bronchi.

The infra-axillary region is bounded above by the lower border of the axillary region and below by the false rib, anteriorly by the inframammary region and posteriorly by the infra-scapular region. On either side we find lung tissue, on the right side the liver and on the left side the cardiac end of the stomach and the spleen.

The location of the heart and the size are very important from a dental standpoint. We find the base of the heart coming to the second intercostal space. The maximum impulse of the heart, or the apex beat, is in the fifth intercostal space from three-fourths to an inch to the left of the sternum. The apex beat does not locate the apex of the heart; the apex of the heart is about an inch to the left of the apex beat.

The right border of the heart we find coming over the mammary region about three-fourths of an inch to the right of the sternum.

The size of the heart has a great deal to do, but by no means all to do, with diagnosing diseases of the heart.

We have within the heart four different valves: The tricuspid, which guards the opening from the right auricle to the right ventricle; the bicuspid, or mitral, which guards the opening from the left auricle to the left ventricle; the semilunar valves, which guard the opening from the right ventricle to the pulmonary artery and the opening from the left ventricle to the aorta. These valves are also called the pulmonary and aortic valves respectively.

These valves normally can always be located in a definite region on the surface of the chest. The tricuspid valves are located in the middle of the sternum opposite the junction of the fourth rib with tthe sternum. The mitral valve is found in the third intercostal space, at the left border of the sternum. The pulmonary valve is found at the junction of the sternum with the third rib; the aortic valve is located half an inch below the lower border of the junction of the third rib with the sternum and laterally midway between the center of the sternum and the left border.

On examining the chest it will be necessary to be able to outline each of these regions, locate the organs in them, and, by the different methods that have been presented, locate the heart, outline the size of it, outline the large vessels, find the location of the valves of the heart, and the locations on the chest where can be heard most distinctly the sounds made by the opening or closing of these valves, which is by no means in the region of the valves themselves.

The sounds produced by the valves are heard as follows: Mitral sounds at the apex, tricuspid sounds at the center of the sternum, at the junction of the enciform appendix with the bony portion of the sternum.

Pulmonary sounds in the second intercostal space one-half inch to the left of the sternum. Aortic sounds in the second intercostal space one-half inch to the right of the sternum, the cause of the sounds being heard distant from place of origin, as the sound is transmitted along the muscular wall of the heart or vessel wall to the place on the chest where they are nearest the surface of the chest wall.

This should be interesting from a dental standpoint in giving both a local and a general anaesthetic. Certain anaesthetics may be given with impunity, even if heart disease is present, while other anaesthetics will almost certainly mean injury if not death to the patient. The dentist is given at present a wider range for the practice of dentistry than he has ever been given before. He is privileged to administer local and general anaesthetics to a certain extent, and before long he will, and should have, as much right to advise a general anaesthetic as a physician; but until he is able to recognize the condition and location of the organs as they have been presented, it will be impossible for him to administer these anaesthetics.

INSPECTION.

Of the methods of examination the two most familiar to the dentist are inspection and palpation. By inspection we mean that which we can see by simply looking at the patient, without any further means of diagnosis.

First, we notice the posture of the patient, if standing, erect or whether the shoulders are stooped, whether the features are distinct and well cut, the shape of the nose, the position of the lips as to whether they are open or closed, the size of the lips, the position of the chin, whether the cheek bones are prominent or well rounded, the size and slope of the forehead, the position of the ears, as to whether they stand out, or whether well to the side of the head, and whether they are normal in size and shape, whether the eyes are normal, equal in size and shape, condition of pupils and lids, lines of the face, whether the face is intelligent or shows signs of degeneracy.

Taking up the inspection of the chest.

First, as to size. We have two kinds of chests—the small chest and the large chest. A small chest may be the result of long sickness in bed, of rickets from infancy, adenoid growths, or both adenoid growths and rickets. As to rickets from infancy, which is a softening of the bones, we have along the costal cartilages often what is known as the rosary of rickets, so named because at the junction of each rib with a costal cartilage there is a slight elevation, and by looking along the junction of the ribs you see a number of slight eminences in appearance similar to a

rosary. In Fig. 3 we have what is called the flat chest from side to side, the dotted lines representing the normal chest, the straight line the chest of the infant troubled with rickets, showing that in the lateral diameter it is narrow, while the antero-posterior diameter is long.

We have another shaped chest due to rickets, which is called pigeon breast (Fig. 4); the back is almost straight from side to side, there being no slight concavity in the region of the vertebrae that we find in normal children. The sternal region is pushed out something like the breast of a pigeon, from which it derives its name—the pigeon-breast chest of rickets.

There is another form, and that is the funnel-shaped chest; instead of having the sternum prominent, we have it drawn in so as to form a concavity or depression where we have the protrusion in Fig. 2. In the child having the funnel-chest, another malady, that of adenoid growths or some obstruction to the air-passage is nearly always present. If the air-passage is clear and the respiration full and free they will have the pigeon-breast; if the air-passages are obstructed from any causes you will more than likely have the funnel chest.

Tranverse section of healthy adult chest at level of sterno-xiphoid articulation (Fig. 5). Comparing the normal chest with the abnormal chest; in the normal chest represented here, the sides are symmetrical; the lateral diameter is greater than the antero-posterior diameter. In right-handed people the right side of the chest may be from half to three-quarters of an inch greater in circumference than the left side, while in left-handed people the left side is greater than the right side. The shoulders should be on a level normally; it may be half an inch higher on the right side in laboring people that are right-handed, while the left shoulder may be slightly higher in left-handed individuals.

Bilateral enlargement of emphysema (Fig. 6). Here we have just the reverse of what we have been speaking. Let the circle be our standard from which to judge the other lines, the dotted line representing the normal chest. We have a malady which is called emphysema, or barrel-shaped chest, where the antero-posterior diameter is greater than the lateral diameter, but we do not have the drawing in of the ribs characteristic on the sides as we have in Fig 1 or Fig. 2. There is no tendency

toward pigeon-breast, there is no tendency toward funnel-chest; as far as the chest is concerned it is symmetrical.

The flat chest is that represented in Fig. 7. The dotted line again represents the normal chest, the continuous line the flat chest. We notice a convexity at the vertebrae instead of the slight concavity that we have normally.

Anteriorly we have about the normal appearance, but the antero-posterior diameter is very much shorter, while the lateral diameter is markedly increased. This chest we find as the result of long sickness in bed, tubercular conditions, pleurisy of long standing, and emaciation due to starvation, also contraction following pneumonia.

Fig. 8 represents an asymmetrical chest. In actual measurement of this chest, the right side measured 32 inches; the left side measured 29 inches; transversely from the median line to the right side was 10¼ inches, to the left side 9½ inches. This kind of a chest we find in pleuritic effusions, which are generally unilateral, tumors of the thoracic cavity, unilateral emphysema (rare), enlargement of the chest due to diseases of the opposite side; for instance, we may have the bronchial tube of the left side stopped so that air cannot enter the lung, the lung will collapse, the right lung must do the work of both the right and left lung, consequently we have an enlargement of the right side; tubercular conditions of one side where we have a destruction of the lung tissue; abscess of the lung followed by scar tissue and contraction of the lung which brings about contraction of the affected side, and expansion of the healthy side; pleurisy that has existed for a number of years with adhesion of the two layers of the pleura with contracting compressing the lung, cause an enlargement of the opposite side. So the enlarged side, so far as a chest is concerned, may be normal, while the small side may be normal or abnormal. We may have an enlargement which is healthy, the small side being the diseased portion.

Not always is the enlargement of the chest due to conditions within the thoracic cavity. The liver, lying in the abdominal cavity. The liver, lying in the abdominal cavity just below the diaphram, may be enlarged, pushing up the lower ribs, thereby pushing up the diaphragm and lungs, enlarging the corresponding side. Again, we may have the left side of the chest larger, due

to a dilated stomach; but more frequently we have an enlarged spleen, which would push up the ribs and the diaphragm, and cause an enlargement of the left side of the chest. Ovarian tumors become of such an enormous size that they push the viscera of the opposite side, pushing up the organs, as the spleen and the stomach, until there is an enlarged condition of the chest. So it will be seen that when an abnormally large chest is examined, the examiner must look farther than the diaphragm, because the large chests will be due to causes or diseases below the diaphragm.

Paralysis is another condition in which we may find the abnormally large chest on one side. For instance, supposing that the diaphragm of the left side is paralyzed, that will hinder the expansion of the lung on the left side, and this will result in an enlargement of the right side of the chest.

We have another condition which we will let Fig. 7 represent. That is the paralyzed chest. In the paralytic chest we find short center-posterior diameter, the clavicles are always prominent, the shoulders are stooped, the scapulae are prominent, the neck is long, and the costal angles very acute.

In the barrel chest, to which I referred a few moments ago, we find almost the reverse condition. We find a great anter-posterior diameter, the costal angles are obtuse, the shoulders are high and the neck short.

In poorly nourished patients we find emaciation; with that the ribs are prominent, the scapulae stand out, the clavicles project, with a hollowing above the clavicle in the supra-clavicular region and a depression in the infra-clavicular region.

The deformities of the chest may be due to spinal curvature. A great many children with a ricket or gouty diathesis have what we call curvature of the spine. Some of them are very appreciable and you can see them at a glance, others it is almost impossible to diagnose. In diagnosing curvature of the spine, take a skin pencil or a colored piece of chalk and locate each spine and dot it black or red or blue, and after you have them all dotted, having the patient stand with the hands at the side, the head erect, you can notice very readily whether the spines are perpendicular with the floor or whether there is a slight curvature to the right or to the left. Often we have a compound curve—one in the

upper part of the dorsal region and one in the lumbar region. They may both curve in the same direction, but more often the upper one will curve to one side and the lower one to the opposite side.

Pott's disease, which is tuberculosis of the spine, is another cause for curvature of the spine in both young and old.

In inspection, we not only notice the shape of the chest, but we should also notice the movements during inspiration and expiration. The right lung, remember, has three lobes, and the left lung has but two. Normally we have in inspiration a little more expansion of the right chest than of the left. Normally we should be able to expand the chest from two to five inches, depending a great deal upon the occupation and habits of patient.

We have in chronic phthisis a lessened expansion of the chest during inspiration. Pleuritic adhesions lessen the respiratory movements; emphysema, pneumonia and intercostal neuralgia all lessen the respiratory movements. Referring to Fig. 9, we let line R represent the ribs with their corresponding intercostal spaces, the dark line E represents the diaphragm in a full expiration, line I the diaphragm in a full inspiration.

We have three varieties of breathing: Abdominal, inferior costal and superior costal. Normally we breathe using the abdominal muscles, or the abdominal respiration. Fashionable women that lace use, instead of the abdominal breathing, the superior costal, because it is impossible for them to use either the inferior costal or the abdominal type of breathing.

If we have a patient lie on his back with his feet to an open window, the other windows in the room closed or darkened, by placing the eyes on a level with the thoracic cavity we can see the movement of the diaphragm; in a full expiration we can notice a line at the seventh rib; if we ask the patient to take a deep inspiration, we notice this dark line descending as far as the ninth rib, passing, then, through a space of about two to two and one-half inches. This is called Litten's diagnosis diaphragm movement. The movement may extend over three to four inches in athletic individuals, while in diseased conditions it may be very slight or absent. In tubercular conditions far advanced we have an abscess of the diphragm movement; in emphysema, in pleurisy with

effusion, in pleuritic adhesions, pneumonia and intercostal neuralgia, an absence.

We may have a bulging of the thoracic cavity due to tumors or displaced organs in the abdominal cavity. We can diagnose by watching the shadow of the diaphragm whether this condition has caused the bulging or the diseased condition above or below the diaphragm. If the trouble is below the diaphragm you will have the excursion of the diaphragn normal or practically normal, while if it is above the diaphragm you will have a lessened diaphragmatic excursion. This is a very important point from a diagnostic standpoint, when it will definitely locate your trouble above or below the diaphragm, and it is a point that is not used half enough from a medical standpoint in diagnosing diseases.

In dysponea, which is difficult breathing, we may have the cause due to heart disease, pneumonia, large pleuritic effusions, emphysema, asthma or tuberculosis.

Inspiration normally should be longer than expiration. In asthma we have a long expiratory sound, with a short inspiratory sound, or, by inspection, we have a short heaving of the chest with a slow falling, expiration being sometimes three or four times as long as inspiration.

Cheyne-Stokes' breathing we have in cardiac diseases, in renal diseases, or in cerebral diseases. Cheyne-Stokes' breathing is always a serious condition. It is, you will remember, a number of short inspiratory movements, followed by a number of short expiratory movements, with a pause, followed again by a number of short inspiratory movements and a number of short expiratory movements. This condition we have in nearly every case just before death.

We may have restrained breathing in pleurisy due to the pain that a deep inspiration would cause. We notice a patient start to take in a full inspiration, all of a sudden they stop, they hold their breath a while, and then proceed with the expiration, and the next inspiration may be a repetition. We also find this in intercostal neuralgia, in pleurisy, in rheumatism, and in pneumonia. These conditions you must be able to diagnose, whether you have the rheumatism, intercostal neuralgia, pleurisy, pneumonia, or what the trouble may be. In some of these conditions

it will be perfectly proper for a dentist to proceed with his work; in others it will be an indication for him to cease his operation at once.

By inspection we also notice the normal condition of the heart. The apex beat in the adult, you remember, is in the fifth intercostal space; in children you will normally find it in the fourth intercostal space, or lying behind the fifth rib; in old age you may find it behind the sixth rib, or even in the sixth intercostal space. The position of the patient also has a great deal to do with the apex beat.

Normally we find it in the fifth intercostal space, three-fourths of an inch to the right of the mammary line, if the patient is in a standing or in an upright position; if he is lying on the right side the cardiac impulse may move an inch to an inch and a half to the right; if on the left side, an inch or an inch and a half to the left of the normal position.

We have a displacement of the heart due to hypertrophy or enlargement of the heart. Pressure from below the diaphragm from any cause—enlarged liver, enlarged spleen, enlarged stomach, effusion into the abdominal cavity, tumors—will cause a displacement of the heart. Aneurism of the arch of the aorta will force the heart downward. Fibroid phthisis of the right side will cause the heart to be pulled in the same direction, or to the right side, due to the contraction of the fibrous tissue; fibroid phthisis of the left side will pull the heart to the left side. Spinal curvature will push the heart gradually upward and to the right or to the left, depending on the direction of the curve.

In rickety chests of the adult the thoracic organs may all be displaced. We may find the apex of the heart as far over as the axillary region; we may find it lying behind the fourth rib. So in examining a rickety chest you must make allowance for the shape of the chest in examining the heart.

Dextr-cardiac, or Situs inversus, is another very rare condition in which the heart is situated on the wring side of the thoracic cavity; i. e., the apex beat will be on the right side instead of the left, and the heart largely on the right side.

(To be continued.)

NOTE—The drawings mentioned in above article will appear in next issue.

PHYSICAL DIAGNOSIS AS RELATED TO DENTAL COLLEGE CURRICULA.

Chairman's Address, Delivered Before the Section on Stomatology, at the Fifty-Third Annual Meeting of the American Medical Association at Saratoga Springs, N. Y., June 10-13, 1902.

A. H. PECK, M. D., D. D. S., CHICAGO.

In view of the fact that during the past two years a number of the state board of dental examiners throughout the country have added the subject of physical diagnosis to their list of studies, which must be passed to secure a license to practice dentistry in their respective states; also, that I have for some years been impressed with the desirability and, I may say, necessity, of adding this subject to our dental college curricula, I concluded this would be as fit a subject as any for my paper at this time.

Heretofore this subject, whenever taught at all, has received what I may term unconscious attention from various teachers; that is to say, in the regular teaching of their departments they have naturally referred to phases of physical diagnosis, but not until the past year has the subject been made a separate department and a complete course of instruction given.

The knowledge of man has steadily increased, keeping apace with civilization. Man has been brought to a higher plane through scientific investigation; his mind broadened and ripened in the fields of research. The furtherance of their profession and the elevation of their fellow-men have ever been uppermost in the minds of the great men of the past.

As you are familiar, it was discovered ages and ages ago that teeth were filled with pieces of wood, ivory and other materials, as evidenced by the researches of the catacombs of Rome and Naples, thus assuring us that the art of preserving teeth was known to our ancestors of those very early times. Unfortunately, however, we do not know who the great dentists of those ages were, as the records of this work have been lost. Had this work been entirely satisfactory to these dentists and their patients, the latter being pleased and contented with such operations, our profession would never have attained to its present high, enviable position in this professional world.

Dissatisfaction with prevailing methods, and the laudable desire to excel, set men to thinking and to doing, the result being that dentistry has developed from a humble trade to an honored profession, affording a field for usefulness to thousands and whereby the suffering of the entire civilized world can be and is, in a great measure, alleviated.

During the past few years the courses of study have been lengthened in all professional schools. Only a short time has elapsed since a medical student could graduate after attending two courses of instruction of six months each, but now one is required to attend four years of nine months each, after having gained a good scientific or classical education as a foundation upon which to build his professional knowledge, thus requiring from six to eight years of college work to receive his degree of doctor of medicine. Let us not forget that dentistry has by no means been slumbering all the while, for the educational requirements for admission to a dental college have been steadily advancing, and the number of years and length of terms increasing, until now schooling equal to the second year of high-school work is required, and in another year four years of seven months each will be required.

Only a few years ago a student received a few lectures on physiology, when that part of his course was considered finished, bnt now it is one of the most important branches he has. Histology, pathology and bacteriology have become important subjects, and the dentist would also be considered very lame without a knowledge of anesthesia and oral surgery. More than this, the amount of practical work that must be done as a part of the dentist's preliminary education has more than doubled. What is the object of this advance? It is that his knowledge may be broadened, extended and that he may be placed on a higher plane with mankind, as well as that he may be better able to satisfy himself and his patients after engaging in the practice of his chosen profession.

We, as professional men, are continually being called upon to give opinion as to the etiology and prognosis of certain diseases, and who will attempt to gainsay the statement that this we should be not only willing but able to do, and it is imperative that we be as nearly correct in such counsel as possible. At times

we find this easy, and again it taxes us to the limit, if not beyond; all our knowledge and reason is called into play before we are able to make definite statements.

It is not always an easy matter to tell just how much vitality a patient has, nor how much of a nervous shock one can endure, nor how long one can remain in a dental chair at a sitting without sustaining material injury. This we, as dentists, should know, so that our patients, on leaving our offices, will have received professional benefit instead of injury.

Who of you have not seen or are not cognizant of neurotic patients who were nervous wrecks for days after having had a large amount of dental work done? With the requisite knowledge and the exercise of forethought and judgment, all this can be avoided. A few more sittings of shorter duration would have completed the work, at the same time acting as a stimulus rather than a nervous shock. This knowledge we can gain only by a thorough study of our patients, and an understanding of the cause or causes of their ailments.

I hope to see the time when a dentist will inquire into the health and symptoms of his patients before deciding on the amount of work that is proper and safe to be done at any one sitting, as should a physician before prescribing a certain amount of a drug or drugs that are to be given for an ailment of the patient.

To judiciously outline our work we, as dentists, must have as thorough a knowledge as possible of the various diseases of mankind, especially those affecting the vital organs or those organs most likely to suffer when shock is inflicted. The symptoms of these diseases, also the physiologic changes that may occur, are necessary to be understood. Who of us would keep a patient, afflicted with organic heart disease, in our chair for an unusually long and fatiguing operation if we be able to inform ourselves of the true condition of these parts.

There is only one way for us to gain this knowledge, and that is for us to familiarize ourselves with the normal heart, as to location, size, beat, rhythm and sounds, thus enabling us to recognize pathologic conditions when present. How embarrassing it must be for any dentist, after advising the administration of a general or local anesthetic, to be told, on consulting the

family physician, that such a course would mean certain death to the patient, whether true or not.

Physical diagnosis is the term used to designate those methods which are employed in the detection of disease during life by the anatomic changes produced by it. The nature and extent of such changes can only be recognized and appreciated by the divergence which they cause in the affected organs from the known physical condition of these organs when in health.

The significance of physical signs in disease cannot be determined by theory; only by clinical observation confirmed by observation after death can this significance be determined.

If it be granted that it is at all desirable that the dentist shall possess this knowledge I am talking about, it at once becomes evident that he must enter into a systematic and thorough study of the only methods by which these physical signs can be determined in the living subject, and these methods are: 1, Inspection; 2, palpation; 3, mensuration; 4, percussion; 5, auscultation; 6, radioscopy.

Some of these methods have been in use for many centuries. Palpation, for instance, was used in the Neolithic or polished stone age, 1500 B. C., to demonstrate the presence of fluctuation, while radioscopy is practically new. This method is the outcome of the discovery of the x-ray, by which, with the use of the fluoroscope, tumors or solid bodies are located in various parts of the body, that were impossible of discovery before. Fractures of bones, the exact kind and position, are determined by looking at the bone direct. Tumors of the internal organs are observed by this means, thus enabling one to diagnose conditions which were impossible of discovery before the x-ray was in use.

One must also be conversant with the various areas into which the body is divided and which are bounded by definite anatomic relations. This is necessary that one, being familiar with the normal size and location of an organ, can determine whether it is in its proper position.

It is necessary to know that the first area from a physiologic standpoint is the supra-clavicular region; and that this area is definitely bounded below by the inner three-fifths of the clavicle, internally by the treachea, and superiorly by a line extending from the junction of the outer with the middle third of the

clavicle to the top of the trachea. Also, it is necessary to know that normally within this area are to be found the apex of the lung, the carotid artery, the subclavian artery, the subclavian vein and the jugular vein.

Next below this is the clavicular region, which is that part of the thoracic cavity lying back of the inner three-fifths of the clavicle. An understanding of the anatomic boundaries and contents of this region is also necessary, but with which I shall not inflict you in this paper.

The most important regions, from the standpoint of the dental practitioner, are the following: Infra-clavicular, the boundaries of which must be carefully studied, that one may recognize the presence of the vital anatomic structures and organs in their normal positions. In this region are to be found, on the right side, lung tissue, the ascending vena cava, the right bronchial tube lying back of the sterno-costal articulation and also a small portion of the arch of the aorta. On the left side are found the pulmonary artery from its origin to its bifurcation, the left bronchial tube lying a little below the second sterno-costal articulation.

The next region of special importance to the dentist, and which lies immediately below the preceding one, is called the mammary region.

The lowest region in the anterior aspect of the thoracic cavity is called the inferior mammary.

Centrally located is the sternum, this area being divided into three regions: (1) The supra-sternal; (2) the upper sternal, and (3) the lower sternal.

The back is divided into three regions: (1) The supra-scapular; (2) the infra-scapular, and (3) the inter-scapular.

All these regions should be carefully studied, as indicated above, in the two instances in which the boundaries and contents are stated.

A knowledge of the size and exact location of the heart is especially important. In the average subject the base of this organ is found at the second intercostal space, the apex beat or the maximum impulse being at the fifth intercostal space, from three-fourths to an inch to the left of the sternum. It

must be understood that the apex beat does not locate the apex of the heart, the latter being about an inch to the left of the beat.

The anatomy of the heart must be studied. It is necessary to know that there are four different valves, and what is expected of them in the performance of their normal function, and that the positions on the chest where the sounds made by the valves can be most distinctly heard are not immediately over the organ.

I thus briefly outline this foundation work that there may be no mistake as to what I consider necessary in the schooling of prospective dentists, that they may be able intelligently to apply the six methods of eliciting the physical signs of the various pathologic conditions of those diseased organs bearing directly on the practice of dentistry.

It is also necessary to be thoroughly conversant with the meaning of these various methods of physical diagnosis, how each is to be employed, and what is to be learned by it; that inspection means only that which can be determined by looking at the patient without further means of diagnosis; that palpation means the examination of the parts by the laying on of the hands, and in this method only the tips of the fingers may be used, or the palms of the hands as a whole; that with mensuration certain facts are to be determined by the process of measuring; that by percussion is meant the tapping of the chest to elicit certain sounds under the varying conditions; that there are different methods of percussion, the immediate and the mediate; that auscalation is the act of listening for sounds within the body, chiefly to ascertain the condition of the lungs, heart, pleura and other organs; that there are different methods of ausculation, the immediate, which is the application of the ear directly to the part, and the mediate, which is by use of the stethoscope. The pulse is such an accurate index to many of the lesions of the heart, it is necessary that one shall understand it in all its variations.

Thus would I have dental students instructed. I trust this paper will receive full and unrestricted discussion, for I want to know whether, in your judgment, this branch should be added to the curriculum of our dental institutions of learning.

This is a subject that has engaged my attention for some time, and it was my desire more than two years ago to present

this subject to the profession and urge its teaching in our schools, but listening to the advice of trusted friends that the time was not ripe for it I desisted. During the past year it has been taught in the institution with which I am connected.

As I see it now, I cannot understand how anyone can advise otherwise.

I hope to see prospective dentists so instructed in the future that they shall be able to recognize diseased conditions of at least these vital organs, and thus be enabled to avoid serious and possibly fatal mistakes. When this knowledge is acquired and successfully practiced, the dentist at once gains the implicit confidence of his patients, his word with them becomes law, and his opinion is sought and respected. Such a dentist is a real benefactor in the community in which he resides and his success is assured.

He also has the satisfaction of knowing he is one who has participated in that "higher education," the practice of which can only result in assisting to elevate the standard of his profession, and to place it on a higher plane in its relation to other progressive professions.—*The Journal of the American Medical Association.*

(On account of the similarity in the two articles on this subject we print the paper in full.—Editor.)

THE FORTY-SIXTH ANNUAL MEETING OF THE MICHIGAN STATE DENTAL ASSOCIATION, HELD AT GRAND RAPIDS, MICH., JUNE 9-10-11, 1902.

Reported by R C. Brophy, M. D., D. D. S.

It is doubtful, if, in point of attendance, interest and enthusiasm, the Michigan Association ever held a meeting excelled by this one; indeed, in these particulars, and, it may be added, in the very important matter of favorable facilities for holding a good meeting, this convention was a remarkable one. About 250 dentists were in attendance, including a number of non-residents of the state.

While the programme was not remarkable for magnitude, it had been arranged to command the interest of the practitioners in attendance, that class of papers so commonly and properly re-

ceived with passiveness and indifference being notable for their absence.

If state societies would exert more strenuousness in censorship of papers offered, paying more regard for merit in adaptation to the matter of greatest prevailing interest and less regard for making up a lengthy programme to overtax the time at their disposal and human ability to sit upon a hard chair for long stretches of time contentedly, I believe more general interest would develop in their meetings, and that their purpose would be much better subserved.

Grand Rapids is an excellent convention city, and the hotel in which the meeting was held was nicely adapted to such purposes, affording a fine hall for meeting and clinics and excellent facilities for the exhibition of goods, all upon the same floor.

The programme announced that the first session of the convention would be held at 10 o'clock Monday morning, but, owing to the fact that many members of the association do not like to miss Sunday evening services, which leaving home on Sunday would necessitate, the attendance at this hour was so limited that the forenoon session was abandoned. Monday is a bad day for the opening of a convention.

Not until 2 o'clock in the afternoon of Monday was formal opening announced, President C. H. Oakman of Detroit calling the meeting to order at this time.

For some reason, which was not explained, the usual custom of preceding the order of business with Divine invocation was departed from.

President Oakman presented Mayor Palmer of Grand Rapids, who extended a very cordial welcome to the visiting dentists on behalf of the city. He said he had advised the police department that there was no use of their being particular whether the dentists were there, and to just let things go. Following the mayor's address President Oakman delivered his address. Among other excellent things he said: "This association should not rest content on its past efforts, for we have hundreds of good dentists in our state who ought to be enrolled on our books. If the teachers in our dental colleges would endeavor to impress on the minds of the students the necessity for early affiliation with some dental society the battle would be half won. This would be

natural home missionary work. I would suggest the appointing of a body of practicing dentists by the governor of the state or mayors of our cities or health boards to examine the children's teeth in our public schools and all public and state institutions."

Particular stress was laid upon the bearing which such procedure would have on the protection of the temporary and first-appearing permanent teeth.

Following the president's address the different committees rendered their reports.

Dr. E. B. Newell of Grand Rapids fired the first scientific gun by reading a paper on "Pyorrhoia." No new theories in regard to causation were advanced, the trend of the paper being along the line of treatment. While the paper was an able one in disclosing personally successful methods of practice, it did not seem to arouse a very great amount of enthusiasm. Dr. S. M. White of Benton Harbor opened the discussion of Dr. Newell's paper, and expressed approval of a goodly portion of the essayist's deductions, but on some few points declared himself of opposing mind. A few others participated in the discussion, but no agreement was reached.

Dr. C. Blair Blackmar of Jackson next took the floor and read a paper entitled "Mal-Occlusion and Caries of the Teeth," the import of the paper bearing upon the relationship of the two conditions. The reporter did not have the pleasure of listening to this paper, but heard very favorable comments following it. Dr. Watson of Detroit opened discussion of this paper. This closed the programme for the first day.

Tuesday morning found a greatly increased attendance, and the morning session was opened by the reading of a paper by Dr. W. T. Reeves of Chicago, entitled "The Possibilities of Porcelain as a Filling Material." It was plainly evidenced that this subject was one commanding extreme interest, as at the present time it is generally doing. The extensive experience which the essayist has had in this particular line of work is generally regarded as constituting him an authority, and the dentists of Michigan assembled manifested a decided interest in listening to what he had to say of the subject.

A retrospective snyopsis of porcelain inlay work was first given by the essayist, showing the slow stages by which it has

attained its present successful status and the many doubts and discouragements that have persistently followed efforts to develop and popularize the work, and which have threatened even the more persistent votaries to abandonment.

The essayist, as a first recommendation of porcelain inlay work, dwelt upon the fact that of all the methods of filling teeth this is unquestionably the one most potent in preventing recurrence of decay. In a tooth affected by caries, even though it be one of the kind most susceptible to the disease, a porcelain inlay properly adapted permanently arrests the breaking down process in the lesion filled. This cannot be accomplished so positively with any other filling material in use.

The question of the advantage of porcelain inlay work from an esthetic standpoint was not considered by the essayist as one calling for consideration in his paper, he assuming that this particular would be generally conceded. The method of cavity preparation was given in detail, and the fact disclosed that all manner of mechanical retention which had in the earlier days of the work been deemed necessary were now renounced, and that a simple "saucering out of the cavity, with a slight square seat some thing after the order of the rim on the saucer which forms its base, to prevent the inlay from slipping out of the cavity, is now all that is found to be necessary. The essayist followed the process of obtaining the matrix and of building up the body to best obtain desired color effects, minutely, and also described in detail the process of baking and inserting the inlay. The fact that Dr. Reeves carried the process of inlay making, as laid down in his paper, through to practical demonstration in the clinic added greatly to the value of his work at this convention, which should have been, and was, highly appreciated.

Following Dr. Reeves, Dr. Truman W. Brophy of Chicago gave a lecture, illustrated by stereopticon, entitled "Oral Surgery." The lecture was confined to the lecturer's operations for cleft palate and the anatomical details of the condition and surgical details of the operation were very fully illustrated and described. At the close of the lecture a little girl, upon whom the lecturer had operated in infancy for a very extensive cleft of the palate, was brought before the convention, and rendered a declamation, disclosing absolutely unimpaired articulation of words,

furnishing positive proof that when this operation is performed before speech is developed there follows no impairment of it.

Dr. Herbert M. King of Grand Rapids followed Dr. Brophy with a paper on "Empyema of the Aubreten," in which this condition was very scientifically discussed. This concluded the reading of papers for Tuesday.

Wednesday morning Dr. J. Taft of Ann Arbor read a paper entitled "The Cause of Hard and Soft Teeth." This subject was dealt with so exhaustively that justice cannot be done the essayist by the mere casual reference to which our space restricts us. Dr. John A. Watling opened the discussion of Dr. Taft's paper.

Following Dr. Taft's essay and concluding the programme in the matter of papers, Dr. Preston W. Hickey of Detroit read a paper entitled "The X-Rays in Dentistry," and gave a demonstration of X-ray photography, which was very interesting and instructive.

While the meeting was decidedly partial in its devotion to papers, yet there were given about twenty clinics upon various phases of practice. Of these the clinics of Dr. W. T. Reeves commanded the greatest interest; indeed, his work in restoring the greater portion, including all the occlusal, of a central incisor, in porcelain, almost monopolized attention. The reporter, because of space limitation, finds it impossible to cover the clinic list entire in a detailed description, and though a number of clinics were given which were of sufficient interest to call for description here, yet necessarily they must be passed.

On Tuesday evening the dentists of Grand Rapids tendered the convention a reception and concert. The banquet rooms of the Pantlind Hotel were utilized for the function, and a very enjoyable programme was rendered by the Schubert Club and Temple Quartet.

The election of new members resulted in forty-two new names being added to the association's membership roll, a very creditable showing. As a result of the election of officers, Dr. E. A. Honey of Kalamazoo was elected to the presidency of the society, and Dr. C. C. Noble was made vice president, while Dr. F. H. Essig of Dowagiac and J. Ward House of Grand Rapids were continued in the offices of secretary and treasurer respectively.

Petoskey will be the next meeting place.

Editorial...

To the Readers of the American Dental Journal:

In accepting the toga as editor of the AMERICAN DENTAL JOURNAL, I am indeed mindful of the duties and responsibilities which I am assuming, and hope with the kind indulgence of the readers, and help of the faithful contributors, to carry the load with as much ease as is possible, and at the same time to present such papers and articles as shall be the greatest help to the many practitioners both old and young.

I am pleased to state that, beginning with this issue and continuing until the completion of the series, we shall have a series of articles on Bacteriology and Pathology from the able pen of George W. Cook, D. D. S., of Chicago. This will include a complete resume of the doctor's investigation along this line for the past ten years, together with his knowledge as a teacher on this subject in various dental schools. Another series will be upon Physical Diagnosis by Cassius C. Rogers, A. B., M. D., of Chicago, this being a subject which at the present time is receiving a place as a special subject in the curriculum of the best dental colleges of the country, and it being so important to every practitioner in ascertaining the condition before administering local and general anesthetics. This series should not fail to be read by every practitioner in the country, especially by those whose college course was taken at a time when these subjects were not given any especial attention. To those who are in attendance upon a course of lectures on this subject they would serve the purpose of a good text book.

Other articles will be presented on subjects yet to be announced, which will be most helpful to practitioners, and by some of the most able writers of this country. Neither pains nor expense will be spared in giving the best to be had. We solicit correspondence and reports of all cases which will be of interest to your fellow-practitioners. There is much latent talent in

some of our younger practitioners, as well as the older, which has not as yet been developed. It will be our endeavor to bring forth some of this.

I am pleased to learn from the publishers that the AMERICAN DENTAL JOURNAL starts in with a subscription list which many journals could be proud of, with additions being made daily. This is always pleasing to an editor, and I hope that the fondest hopes of the publishers may be realized, in their having in a reasonable time a subscription list which is second to no other journal published.

To my fellow-editors of other journals, I extend the hand of fellowship and hope our relations may always be pleasant and mutual. Their writings have always been a pleasure and an inspiration to me. May they continue so.

J. B. DICUS.

To the Readers of the American Dental Journal.

January 1st, 1893, was the beginning of the present firm of Frink & Young, under the name Dental Exchange Co., address 612 West Adams Street, residence district. Without capital stock, the beginning was necessarily a very modest one.

We had, however, no apprehension as to the outcome. Members of the profession assured us that if we would furnish them with a selection of first-class goods at fair prices, they in turn would give us a liberal share of their patronage.

A casual glance at the present prices of the several staple articles necessary to every practice, as compared with the prices charged for the same article nine years ago, will convince the members of the profession that we have kept faith with them.

And the rapidity of our growth from the very smallest dental dealers in Chicago to one of the largest shows that our business methods have been appreciated, and that the members of the profession have fulfilled their promises of substantial support.

One year later our location was changed to 122 Wabash Avenue, but these quarters were soon outgrown, and in April, 1896, we moved to 612 Masonic Temple. The rapid extension of our business necessitated another removal, and since January 1st, 1900, we have been occupying Rooms 607, 608, 609 Masonic

Temple, probably the best-known office building in the world. Space occupied about two thousand square feet, with factory and storage room space at 528 Nelson Street, three thousand square feet additional.

In continuance with the progress we have made in our commercial line, we are advancing in a literary line, and are placing before you our embryonic issue of the AMERICAN DENTAL JOURNAL, and invite your careful perusal of its contents. It shall be our aim to make each succeeding issue better than the previous one. Neither pains nor expense will be spared in making this a success. Some of the best-known writers of the country will contribute to its literary contents. We aim to solicit nothing but reliable advertisers, and we recommend all advertisers of our journal to our readers. Anything which is not strictly as represented should be reported to us. Please do not forget to state to advertisers when you call or write to them that you have seen their "ad." in the AMERICAN DENTAL JOURNAL.

We want to increase our circulation, and if you think well of our journal send in your subscription at once, and induce your fellow practitioners to do likewise. We want you and every other dentist to read the journal. It is at a popular price and within the reach of all.

Our aim is to merit the confidence which the members of the dental profession have placed in us in the past, and wish to assure them that we will show our appreciation by prompt and careful attention to their wishes. We thank the members of the profession for their liberal patronage in the past, and ask the same consideration for our journal that has been given to our commercial efforts. We remain,

Yours very truly,

FRINK & YOUNG.

What are you doing in your practice, especially in the way of prophylactics?

We all in a perfunctory way do something, and we give advice according to our understanding when asked. Sometimes we volunteer advice, even taking pains to impress our patients with the importance of what is due on their part toward the preservation of their teeth. Sometimes the seed falls upon good ground

and sometimes it does not, and this is the great trouble we have to contend with in what we attempt to do in this direction. We all know how nature comes to the aid of the regular practitioner in medicine when a patient calls him to prescribe and then throws his medicine out of the window. It is an old story. In a large number of cases the patients get well just the same.

In our branch of the art of healing and restoring nature is not so kind. When teeth fall into decay she does not come to our rescue, but, on the other hand, she seems indifferent, so far as reparative efforts go, to the lesions of these human organs, if not altogether bent on hurrying them out of our economies. Throwing our remedies out of the window won't do. We must have the most sincere co-operation of our patients if we are able to prescribe ways and means to successfully prevent and preserve.

When our patients come to us for operations of repair, they co-operate by submitting more or less gracefully to the methods we must employ to be able to benefit them. They place themselves in our hands and we accomplish the restorations known to our art according to our best judgment and ability. We accomplish our purpose.

In prophylactic measures we prescribe what our patients must largely carry out for themselves.

The field is a difficult one to work in with success in all cases, or any large number of cases, under present conditions, because the people are not generally educated up to looking after their teeth in this way, waiting usually until damage is done and disturbances drive them to the dentist, and because of the proneness of humanity to neglect even the advice they may ask and pay for. We could all do much more for our patients in the way of prevention if they would let us. They lean too heavily on Nature, until by sad experience, perhaps, they find she cannot be relied upon, as concerns the teeth of the civilized portion of our race at least. Of course, people with any pretentions to refinement use the toothbrush with some sort of frequency and regularity, but we know that while such efforts do much to retard, they do not altogether prevent decay.

Now, when they come to us, what do we do? When we have gone through a scaling process, if apparently needed, and rubbed them up with an engine point (more or less suit-

able or unsuitable) and a polishing susbtance, and advised a suitable brush and floss silk and a proper dentifrice—if we know one—and suggest another call in six months, it is safe to say we have done about all the average dentist does in this sort of prophylactic care of the teeth, usually called cleaning.

What we should do, in the opinion of the writer, and what some conscientious dentists are trying to do, is to urge the necessity of more frequent visits to the dentist. Instead of once in six months or a year, have them come once a month, or oftener if need be, for thorough and careful removal of all deleterious accumulations, being ourselves prepared to give them the most approved treatment for such conditions as we may find.

When teeth are in a normal condition, viscid films, calcareous deposits and other accumulations find lodgment with difficulty. The tooth surface is too smooth and polished naturally to permit of any tenacious clinging of substances surrounding them, and such is the condition we should aim to bring about on all surfaces subject to deleterious influences in our process of cleaning, and specially advise and urge our patients in thoroughness in their personal efforts. Some surfaces are easily reached and attended to. Some surfaces are always kept cleansed and polished by the natural uses of the mouth. It is to the difficult places that we should give most attention. There are other things to be done in prophylactic treatment, but it is not our purpose in this article to designate a course if any sure and reliable one is known. It seems to us that we are not fully up to the possibilities of our art and science if we cannot go far beyond what is being done generally in the profession in the way of prevention. Whatever process or technique we may adopt, one concomitant is the unceasing effort to educate the people. Education takes time, but those who have been long in practice know that the people have been educated up to many, many things for the preservation of their teeth, contrary to a lot of false notions that have prevailed in the past. Can we not convince them that prevention is better than cure, or repair, and thus persuade them that it is to their interests to come to us early and often, and pay cheerfully a fair compensation for rendering many expensive, painful, nerve-racking, and fatiguing operations unnecessary?

This journal, in making its bow to the dental profession, proposes to keep this subject to the front for some time, in the hope of interesting its readers in better understanding and better methods than are generally practiced in this line of work, and to that end we invite correspondence and discussion. Let us have your ideas, your theories, your methods, your positive knowledge and experience. This dpartment will be under the personal supervision of Dr. R. B. Tuller, of Chicago.

Who has used the parafin prophylactic treatment for prevention or checking of decay enough to give any facts concerning its success? We shall be pleased to have testimony.

.. ITEMS ..

RESOLUTIONS ON THE DEATH OF DR. EBI.

The Cedar Rapids Dental Society passed the following resolutions on the death of its honored member and ex-president, Dr. Edward Ebi.

WHEREAS, In the death of our friend and fellow practitioner, Dr. Ebi, this society has sustained the loss of a beloved member, who by his dignity and counsels added much to the profit and interest of its meeting, and who as its president for two terms did all in his power to promote the welfare and high professional standing of it's members, and

WHEREAS, We each feel the loss of a true personal friend whose kindly smiles and deep experience did much to cheer and encourage, and

WHEREAS, We believe that the welfare of humanity through his professional attainments was ever his aim and ideal, and his every act was never to bring discredit upon his profession, therefore be it

Resolved, That we pay such tribute to his memory as possible. That we extend our sympathy to the relatives and friends who also have suffered loss, and further be it

Resolved, That a copy of these resolutions be sent to his relatives, and that they be given to the local papers and profes-

sional journals for publication, and that they be placed upon the records of this society.

L. E. RICHARDSON,
C. B. WHELPLEY,
GUSTAVUS NORTH,
Committee.

LATEST DENTAL PATENTS.

700,855. Mold for casting plates, W. Streetman, Cleburne, Tex.
701,616. Crown-slitting forceps, C. J. Reynolds, Pittsburg.
701,627. Dental electromotor switch, E. Schreier, H. Dumler, Vienna, Aus.
701,799. Dental matrix, W. Crenshaw, Atlanta, Ga.
702,073. Dental electric switch, E. O. Pieper, San Jose, Cal.
702,276. Flask-locking device, D. A. Baker, Schenectady, N. Y.

Have you ever been puzzled to know how to enlarge a pin, or lengthen a broken off pin in a Richmond crown, or in a piece of bridge work? This is Dr. R. B. Tuller's method: Take a piece of platinoid or German silver wire and shape with a file such a pin as is wanted. Now around this wrap a narrow strip of thin platinum spirally so that edges meet and so it takes the form of the pin. Now remove and after clipping to length desired slip the large end over the portion of pin remaining in porcelain tooth, when it will cling readily unless, of course, the pin has been broken off too short, which is rarely the case. Now invest and fill up whatever space there may be in the platinum spiral with solder as low as 16k if desired, when of course you have a solid pin securely soldered in place as originally. Then, if need be, a little enlarging of the hole in root or a little dressing down of pin will make it go to place all O. K.—provided, of course, that the broken off part of pin in root has been removed, which is often a greater piece of engineering than replacing pin in crown.

A little cake of parafin is a handy thing to have on your bracket, to touch a warmed instrument to keep cement from sticking; also to touch the edges of your disks with to keep them from

catching into rubber dam. Coating the disk quite freely prevents friction that produces painful heat.

If you want a plaster cast smooth and pleasant to feel in handling and to look smooth and polished sift over the surface a little powdered soapstone and rub in with a brush or the finger. Soapstone is a splendid parting substance for plaster, hence, should not be used where you want to attach more plaster, as when wishing to fasten models to articulators with plaster. Or, when it has been used, scrape off where fresh plaster is to be attached.

R. B. TULLER, D. D. S.

To remove teeth from an old rubber plate heat the teeth gently by passing them through a small flame back and forth, and then push the teeth off with an instrument.

Notices of Meetings

MISSOURI STATE DENTAL ASSOCIATION.

At the annual meeting of this Association, held at Jefferson City, May 21-23, 1902, the following officers were elected: Pres., S. C. A. Rubey; 1st V.-P., J. H. Kennerly; 2d V.-P., F. W. Franklin; Cor. Sec'y, Otto J. Fruth; Rec. Sec'y, H. H. Sullivan; Treas., J. T. Fry; Board of Censors, A. M. Magee, R. J. Winne, W. M. Bartlett; Com. on Ethics, A. J. Prosser, W. H. Rencoe, J. B. McBride; Publication Com., Wm. Conrad, W. G. Goodrich; Com. on History, B. L. Thorpe; Com. on New Appliances, S. T. Bassett; Com. on International Dental Congress During Louisiana Purchase Exposition, W. M. Bartlett, Wm. Conrad, F. F. Fletcher, M. C. Marshall, L. G. McKellops, H. Prinz, B. L. Thorpe. The next annual meeting will be held at Kansas City.

OTTO J. FRUTH, Cor. Sec'y.

NATIONAL DENTAL ASSOCIATION.

The sixth annual meeting will be held at Niagara Falls, N. Y., July 28-31, 1902. A good program is being prepared, and a large and profitable meeting is anticipated. A rate of a fare

and a third for the round trip, on the certificate plan, has been secured on all roads in the United States and part of Canada. Certificate must be taken and full fare paid when purchasing ticket going, and this certificate when properly signed entitles the holder to return for one-third fare. Tickets may be bought from July 22-29, and the certificates for return may be used as late as Aug. 4. A. H. PECK, Rec. Sec'y, Chicago.

MASSACHUSETTS STATE DENTAL SOCIETY.

The thirty-eighth annual meeting of the Massachusetts State Dental Society was held at Boston June 4-6, 1902, and the following officers were elected: Pres., A. J. Flanagan; 1st V.-P., Wm. P. Cooke; 2d V.-P., B. H. Strout; Sec'y, E. O. Kinsman; Treas., J. T. Paul; Librarian, T. W. Clements; Editor, W. E. Boardman; Ex. Com., J. F. Dowsley, Chairman; A. J. Flanagan, W. P. Cooke, W. E. Boardman, D. H. Allis, J. R. Piper, J. F. McLaughlin.

TEXAS STATE DENTAL ASSOCIATION.

The annual meeting of the Texas State Dental Association was held at Waco, May 13-15, 1902, and the following officers were elected: Pres., J. G. Fife; 1st V.-P., T. P. Williams; 2d V.-P., R. D. Griffis; Sec'y and Treas., Bush Jones; Curator of Museum, A. F. Sontag; Ex. Com., W. R. Rathbone, A. J. Beville, C. O. Webb. The next meeting will be held at Houston in May, 1903.

GEORGIA STATE DENTAL ASSOCIATION.

The thirty-fourth annual meeting of the Georgia State Dental Association was held at Macon, June 10-12, 1902, and the following officers were elected for the ensuing year: Pres., J. M. Mason; 1st V.-P., Sam. Rambo; 2d V.-P., E. A. Tignor; Rec. Sec'y, S. H. McKee; Cor. Sec'y, O. H. McDonald; Treas., H. A. Lawrence. The next meeting will be held at Tallulah, June 10, 1903.

ALABAMA STATE DENTAL ASSOCIATION.

The Alabama State Dental Association met at Tuskaloosa, May 14-16, 1902, and elected the following officers for the ensu-

ing year: Pres., W. E. Proctor; 1st V.-P., H. C. Hassell; 2d V.-P., N. N. Vann; Sec'y, J. T. Cook; Treas., W. D. Fulton; Member Ex. Com., J. C. Wilkerson; Mem. Ex. Board, J. A. Allen; Press Editor, T M. Allen.

NEBRASKA STATE DENTAL SOCIETY.

The annual meeting of the Nebraska State Dental Society was held at Lincoln, May 20-22, 1902, and the following officers were elected: Pres., H. J. Cole; V.-P., H. A. Shannon; Rec. Sec'y, W. R. Clark; Cor. Sec'y, H. H. York; Mem. Board of Censors, B. L. Spellman. The next meeting will be held the third week in May, 1903, at Lincoln.

CALIFORNIA STATE DENTAL ASSOCIATION.

At the annual meeting of the California State Dental Association, held at San Francisco, June 10-12, 1902, the following officers were elected for the ensuing year: Pres., Frank L. Platt; 1st V.-P., L. Van Orden; 2d V.-P., W. J. Taylor; 3d V.-P., W. G. Knowles; Rec. Sec'y, C. E. Post; Cor. Sec'y, O. P. Roller; Treas, T. N. Iglehart.

WASHINGTON STATE DENTAL SOCIETY.

The annual meeting of the Washington State Dental Society was held at Tacoma, May 22-24, 1902, and the following officers were elected: Pres., F. R. Fisk; 1st V.-P., N. G. Covey; 2d V.-P., R. S. Williams; Sec'y., A. B. Bailey; Treas., W. M. King.

ILLINOIS BOARD OF DENTAL EXAMINERS.

A meeting of the Illinois State Board of Dental Examiners will be held at the office of J. G. Reid, Sec'y., 1006 Champlain Bldg., State and Madison streets, Chicago, July 8, 1902, at 9 a. m.

J. G. Reid, D. D. S., Sec'y.

CONNECTICUT STATE DENTAL ASSOCIATION.

At the annual meeting of this Association, held at Hartford, May 19-21, 1902, the following officers were elected: Pres., Ed. Eberle; V.-P., T. W. Johnston; Sec'y, F. Hindsly; Asst. Sec'y,

C. P. Prentice; Treas., E. B. Griffith; Ex. Com., G. O. McLean, E. B. Abbey, J. E. Heike; Librarian, W. H. Metcalf; Editor, J. W. Harper.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The annual meeting of the South Carolina State Dental Association was held at Charleston, May 14-16, 1902, and the following officers were elected: Pres., A. T. Pete; 1st V.-P., T. Dotterer; 2d V.-P., D. Aiken; Treas., T. W. Dix; Cor. Sec'y, I. M. Heir; Rec. Sec'y, G. A. Smith. The next meeting will be held at White Lithia Springs.

NEW YORK STATE DENTAL SOCIETY.

The New York State Dental Society held its annual meeting at Albany, May 14-16, 1902, and elected the following officers: Pres., R. H. Hofheinz; V.-P., W. T. Turner; Sec'y., W. A. White; Treas., C. W. Stanton; Correspondent, H. D. Hatch. The next meeting will be held in Albany, May, 1903.

KENTUCKY STATE DENTAL ASSOCIATION.

The Kentucky State Dental Association held its annual meeting at Covington May 19-21, 1902, and elected the following officers: Pres., J. S. Cassidy; V.-P., J. F. Clark; Sec'y., F. I. Gardner; Treas., F. R. Wilder. The next meeting will be held in Louisville, May, 1903.

MICHIGAN STATE DENTAL ASSOCIATION.

The annual meeting of the Michigan State Dental Association was held at Grand Rapids, June 9-11, 1902, and the following officers were elected for the ensuing year: Pres., E. A. Honey; V.-P., C. C. Noble; Sec'y., F. H. Essig; Treas., J. Ward House.

DELAWARE STATE DENTAL SOCIETY.

At the annual meeting of the Delaware State Dental Society, held June 10-11, 1902, the following officers were elected for the ensuing year: Pres., C. R. Jefferis; V.-P., C. J. Kinkead; Sec'y, R. H. Jones; Treas., S. H. Johns; Librarian, Ed. Lewis.

BACTERIOLOGY AND PATHOLOGY.

BY GEO. W. COOK, B. S., D. D. S., CHICAGO, ILL.

[CONTINUED]

Up to this point we have called attention to certain facts that show that bacterial protoplasmic structure belongs to the lowest forms of vegetable life, and when grown under certain physiological conditions it is possessed of a number of vital biological phenomena known to no other living thing. They are an unicellular organism endowed with all the peculiarities of life; the higher formed organisms are built up out of a number of cells; it matters not how high or how low the organization of life may be, the ultimate biological problems must in the last analysis be sought in the cell.

It was in the study of the cell that Max Schultz and Virchow showed that all the various functions of the body in health and in disease was but the outward expression of the cells. It is then to the study of the cell the evolutionist must look for the most useful information on his subject.

Cell physiology belongs to bacteria and can be applied to these organisms very much in the same way as the multicellular organisms, while their functional activities are very analogous, still their structural arrangements are somewhat different. The cells of the higher organization all show a degree of differentiation. Animal cells and most all plant cells contain a rounded body called the nucleus; it is only the lowest plant cells that appear to be devoid of this nucleus. The bacterial cell was at one time considered to be quite a simple plant cell, composed of protoplasm and a membrane, and later they were looked upon as being a somewhat complex structure, but at the present time they are looked upon as being composed of a homogeneous proto-

plasmic mass containing a granular substance; these granules seem to partake of the same characteristics as the nucleus substance in the higher cell organization. Some investigators went so far as to claim that these granules possessed the same characteristic substance as did the chromatine substance of the nucleus of the higher cell organization, because they took the stains in the same way, and especially was this true when the granules arranged themselves in a special way as is often seen in the chromatine threads of the nucleus division of the cell of the higher forms.

Most all bacteria stain very much as nucleus substance. The methods of bringing out the granular appearance in bacteria is a process known as plasmolying, which consists of heating to about the point of the coagulation of albumen, or to take alcohol or a strong salt solution and immersing the bacteria therein. When they are treated in this way, these granular substances appear to take a position as irregular masses, more or less adherent to the cell wall, and give somewhat the appearance of the polar granules in the multicellular organisms. Fisher, however, came to the conclusion that the peculiar staining of these granules in bacteria was due to the physical and not to the chemical condition as was at first thought, and which is perhaps true in case of the higher cell organisms. It is then thought by some that these granules have something to do with the reproduction powers of bacteria, but this ground was probably not well taken.

The study of granules in bacteria leads one to think that possibly bacteria is not the lowest form of life, but as yet we know of no smaller cell structure that is capable of performing all life functions, such as taking in food staff and the powers of reproduction.

In the foregoing pages we briefly called attention to some of the characteristic forms of these micro-organisms; we also stated that there was a possibility of great variation and that a great many cells may be grouped in various ways so that it was not always easy to say that they belong to a particular species, as in case of some of the bacilli forms we have an enlargement in the center of the rod, or one end may become swollen, making truly a club-shaped appearance. In some cases the bacilli may lengthen to twice its original length and divide in the center, thus making two short bacilli. All these variations take place at

various stages of development, while in other instances it may become constricted in the center, producing a typical dumb-bell shape. The variability of form does not exist so much as to make it impossible to separate bacterial life into genera and specie.

In this connection, it is necesary to again refer to the subject of spore formation; here we will treat only two classes of spores found in the lowest forms of bacteria. The first one is that one known as "endospores"; they are small refracting bodies always found in the interior of the bacterial cell. In their process of forming, it requires a special method of staining spores. It is possible to account for the enlargement in the center of the bacterial cell (this is endospores). The other process of sporilization is know as "arthrospores," and are formed at the end of the cell. Sometimes these spores are taken for the polar granules, but a close study reveals the fact that the spores differ very materially from these polar granules that were spoken of as being found in the process of plasmolysis of the bacterial cell. These spores are of the greatest importance, for as has been said, they are by far the most resistant part of the bacterial cell. As for the most favorable condition of sporilization, first they must have an optimum temperature; what we mean by an outimum temperature is one that each individual bacterium grows best, as for instance, a germ that is truly a parasite is one that lives best at the temperature of animal heat, while those that live in the soil would have a very much lower optimum temperature. As to the lowest point at which bacterial spores will form; this depends upon the individual bacterium, for a specie was found which was able to form spores when the water was covered with ice; this was the optimum temperature for this germ; a point naturally arises here At what temperature is spore formation prevented?

I shall here take the anthrax bacilli, as it is always found most suitable for such investigation, in fact, this micro-organism is most always used for such purposes by all investigators, because the anthrax spores have as great, if not greater, resisting power than any other known.

I shall here give the investigation of a number of observers; Pasteur found that when the anthrax bacilli was cultivated at a temperature between 42 and 43 degrees C., spore-formation was completely arrested, while it took twenty days to

render the bacilli non-virulent. Roux and Phisalix were the first to observe that the same could be accomplished with chemical agents, such as the addition of carbolic acid; this phase of the subject will again be referred to. This brings up the question of sterilization in general.

It is a well known fact that a temperature so low as to make it impossible for germs to develop will give practical sterilization; this is what is accomplished in refrigerating chambers; but the only sure way is the absolute destruction of the bacteria, and that can only be accomplished by heat, and if used under pressure, it is much more effectual, for it is a well known fact that it requires a temperature of not less than 120 degrees C. at a ½ atmospheric pressure to produce this.

Many of these methods are used in the process of rendering substances free from bacteria; this is accomplished in the canning process, such as canned fruits and meats; but to be effectual this must be repeated daily for several days at not less than a half hour each sterilization; this is known as intermittent or discontinuous sterilization. Many of the methods that are ordinarily used in sterilization can be applied to sterilizing milk for children, "pasteurization."

All bacteria do not have the same resisting power to heat; on this account it is possible to obtain pure cultures of such bacteria as the hay bacillus. We have, however, no good reason for the difference in the resisting power other than possibly its growth in different media. The chemical composition of the bacterial cell does not vary in quantative or qualitative substance to any great extent, therefore, we cannot say that this variation is traceable to the chemical composition.

The work of E. Cramer shows that in the bacteria, such, for instance, as the bacillus prodigiosus and the bacillus of pneumonia, the change of the quantity of albumin in the bacterial cell depends to some extent upon the amount of peptones in the media in which they grow.

It is well known that all protoplasm contains considerable water, and its irritability depends upon the metal ions such as sodium, calcium, magnesia, potassium, etc. Some bacteria contain starch while others have in their body substance a true cellulose. In some micro-organic cells there is to be found a

mucoid carbohydrate ($C_6H_1OO_5$). It has also been found that the culture media influenced the thickness of the cell membrane which, without question, controls to a large extent the action of chemical agents used as disinfectants; these agents will be discussed later.

Certain forms of carbohydrates are very useful in culture media; such well known synthetic compounds as the polysaccharides, starch, dextrine, cane sugar, maltose and milk-sugar. Investigation by a number of investigators has shown that prussic acid (H C N) may arise through decomposition and act chemically on certain forms of carbohydrates, changing them into certain other forms of carbohydrates.

Prussic acid is one of the well known nitrogenous poisons, but by the rearrangement of the atoms in the molecule, may become non-poisonous substance, thus becoming available as nutritive substance out of which bacteria may build their body substance. The vital phenomena of bacteria are the result of their construction of body proteid out of lifeless substance; Scholl was able to make inactive proteid that had been heated to a temperature sufficient to render it lifeless. Formaldehyde is well known as an antiseptic, even when used in great dilution; but if placed in combination with sodium sulphite (Na 2 So 3), its poisonous properties are at once changed to a nutritive substance for bacteria. Pasteur found that like condition existed in case of tartaric acid ($C_4H_6O_6$) and succinic acid ($C_4H_6O_4$), etc. In fact, most all the organic acids can be utilized as food; an easy, simple experiment is taking a mild solution of ammonia lactate and grow the bacillus of blue milk, which will produce synthetically the same pigment as is produced by the same microorganisms in milk. Many of the organic acids will act only as nutritive substance in the presence of oxygen, while such substances as belong to the aldehyde group (C H O N) are nutritive to those bacteria that grow as anaerobic.

Under the culture media, I called attention to asparagin ($C_4H_8N_2O_3$); this has been considered somewhat nearer proteid than either the ammonia or the aldehyde group. According to the investigation of Low and Fischer, asparagin arises out of the decomposition of proteid (oxidation).

In the experiment of Schutzenberger on proteid, he found a chemical substance that was closely allied to succinic acid; this, Low called amido succinic acid; the chemical formula was written thus: ($C_5H_7NO_4$) or ($C\ H_2\ COOH$)+($C\ H\ N\ H_2\ COOH$).

In the former discussion of a certain formula, we mentioned the possible rearrangement of the atoms in the molecule, in this way bringing about new compounds. According to investigation, asparagin is one of the most nutritive agents for bacterial growth and, owing to high molecular structure, various forms of bacteria are able to oxidize in a way to construct a highly chemical substance, such as pigment or poisonous agents (toxine). It is believed by some that this pigment formed by bacteria is intended to take the place of chlorophyl or leaf green in the higher plants; it is known that this coloring matter assimilates carbonic acid. This is well illustrated in diatoms. One to go into a farther discussion on this subject would lead far into the subject of plant physiology, but there are some facts in connection with bacteria that are necessary to discuss in a deep way at this time. We have some of the higher forms of bacteria that possess a certain substance that is not truly a pigmentation, for instance, the crenothrix, and leptothrix, ochracea, which seems to have the power of acting on certain ferrous compounds, reducing ferrous carbonate to ferric hydroxide ($2\ FeCO_3+3H_2O+O=Fe_2\ (OH)_6+2CO_2$). The presence of iron in the sheaf of these bacterial cells may mean something to us as dentists, for we ofttimes hear considerable discussion of the iron in connection with discoloration of the teeth, but we cannot say, however, as yet, if any of the bacteria of the mouth may, or may not, contain some of this electrolytic element which is so necessary to the molecular structure of some forms of proteid substance.

Right in this connection it is well to call attention to another form of bacteria known as the sulphur bacteria (begiatoa). These are devoid of pigment in the true acceptation of the term, but the physical phenomena of these micro-organisms seem to be obtained through the oxidation of sulphuretted hydrogen. This sulphur compound might be further changed into a milder form of sulphuric acid. The active principle that is involved in

the formation of sulphuretted hydrogen in most all instances is due to the breaking up of proteid substances or reducing of certain forms of sulphates.

There are a great number of bacteria that seem to be possessed with a vital phenomena in this direction. We might take a process that most likely goes on in the depth and decomposition of the pulps of teeth in which discoloration takes place. We have sulphuretted hydrogen form in the process of decomposing the proteid molecule, and either from the iron in the blood or that which is carried there possibly by other bacteria; we have two essential elements necessary for bringing about the discoloration of tooth structure, viz., sulphur and iron. By the union of the sulphur with the iron salts, we get the formation of sulphide of iron. The vital activity of bacteria in such conditions as here spoken of is, beyond question, far greater than we have any definite knowledge of. There are some other very interesting physiological phenomena in connection with physiological activity of bacteria that we will mention here, for instance, if cellulose be decomposed under water by bacteria, we not only have acetic acid, butyric acid, carbonic acid formed, but we also have a marsh-gas formation (hydrocarbon compound).

Cellulose Water Marsh-gas hydrogen

$$(21\ C_6H_{10}O_5)+(11\ H_2O)=26\ CO_2+10\ CH_4+14\ H)$$

It is through some process of this kind that carbonic acid is formed in the mineral waters. It is a prety well established fact, that the formation of coal in the earth and certain formations of rock, is due very largely to some active process of bacteria. The present acquaintance with bacteriology has added considerable to agriculture by the cultivating of plants upon which bacteria grow with the plants.

There are many instances in which micro-organisms have a kind of physiological co-operative growth, that is, one will take up a process of decomposition to a certain point and another will take it up at this point and carry the process of decomposing the substance still farther; this is called metabiosis. There are many instances in which it requires two micro-organisms to accomplish one process; this is well illustrated in the case of manufacturing of kumiss out of mare's milk, the process of which is carried on by the action of a yeast fungi and a branching form

of bacteria. There is another instance in which a yeast and bacterium produce alcohol and lactic acid out of lactose. According to the investigations of Burri and Stutzer, two kinds of bacteria are engaged in the reduction of nitrates through nitrites to ammonia.

The various physiological activities of bacteria are so varied, for instance, in one case there is found two different microorganisms helping each other in the process of decomposing substance, whilst on the other hand, if a bacterium with certain functional activities get a hold no other kind of bacteria can come in; they will find it impossible to maintain life as in the case of lactic acid fermentation, it would be impossible for a germ of putrefaction to live. Some of the putrefactive germs are especially fitted to break down the complex compounds, while others will work up the end products. Biologically, bacterial function is that of transforming inert organic compounds into inorganic substance; this takes place as a rule only after the vital activities of the protoplasm cease. As will be seen, however, there are a certain number that seem to have acquired the faculty of attacking living protoplasm.

The processes of oxidation can properly be divided into two kinds, first, that when the organisms are capable of taking up their oxygen from the air; second, those whose physiological activities are such as to break up and rearrange the organic molecule, containing oxygen. Bacteria not only take up oxygen for their own body substance, but pass some on to the substance which they are liberating; this is what takes place in the conversion of nitrogenous elements into ammonia, nitrous and nitric acids. Bacteria not only have the power to build up their own complex body substance, but at that same time build up a complex substance, such as pigments or a highly chemical compound, such as the organic acid or some of the poisonous agents known as toxines and in many instances it is accomplished both analytically and synthetically, depending upon the individual characteristics of the bacterium. But as has heretofore been suggested, that all of these vital phenomena are dependent upon the environing conditions; for it is well known that there are many chemical elements when brought in contact with living substance, enter into a chemical relation in a way that it acts as a

chemical stimulus; this, when in a normal way, increases cell metabolism. This is best illustrated in the body of human individuals, for here we have food stuff which is usually a proteid. It has been shown that a strong man working hard needs, in the twenty-four hours, a hundred and eighteen grs. of proteid in order to maintain his nitrogenous equilibrium intact. The proteid income beyond a certain measure is stored up in the form of fat. A like condition may be said to exist in the plant kingdom. The carbonic acid of the air serves the plant as food in about the same way as the proteid serves the animal as food stuff. It enters the plant as food and is split up in the chlorophyll bodies of the living cell; the carbon set free is then employed together with the water received through the roots, for the synthesis of starch or assimilation. If the carbonic acid of the air be increased, an increased metabolism would follow up to a certain point, consequently an increase in the amount of starch with the increased amount of food. With an increase of metabolism a recognizable increase in the change of form in the lower forms of life such as bacteria.

If the putrefactive bacterium termo be transferred into a liquid in which they are living, but which is void of some of the nutritive substance, into infusion that contains the necessary nourishing substance, the number will be increased with wonderful rapidity, thus the assimilatory phase of metabolism of these lower forms of micro-organisms becomes enormously increased by the superfluity of nutritive substance.

Under pathological phenomena, this condition is of considerable consequence. There is found certain pathological growths. A condition that is very analogous to this increase of cell development in bacterial forms just spoken of. In the human body we have various kinds of pathogenic neoplasms or tumors, to which belongs the malignant cancer; these tumors (carcinoma, sarcoma, myoma, fibroma, etc.,) arise by rapid division of the cells of normal tissue, which results at this particular place in the large growth or tumorous formation, and if continued, will grow to enormous size, thus choking off the neighboring tissue resulting in molecular death.

Without question, this rapid cell increase is due to a chemical cause. It is an open question as yet, whether or not these

tumors are the result of infection by certain micro-organisms or whether it is due to a change in the nutrition of the cells. We have just called attention to certain physiological factors that increase cell proliferation; these we call normal stimuli. But it must not be forgotten that a normal stimulus can become an abnormal one, a fact just illustrated in the tumorous growth. Right in this connection we will mention some condition of the reverse, the phenomena known as physiological depressions. These substances are usually termed narcotics or anaesthetics.

In this group we will mention here such well known substances as alcohol, ether, chloroform and chloral hydrate, and with these belong a great group of vegetable alkaloids, viz.: morphine, quinine, veratrine, digitaline and strychnine, etc., some of which act on a great variety of cells, while others act upon certain cells. The depressing effects of these agents upon the phenomena of cell metabolism has been extensively studied by a number of physiologists and bacteriologists.

I will give here a simple experiment that is well known to all laboratory workers, for instance, the yeast cell which is well known in their course of metabolism, to split up grape sugar, place in two fermentation tubes, to one tube add a weak solution of chloroform water, and place in an incubator; we will call the tube containing the pure solution of grape sugar, tube No. 1. The one containing the grape sugar solution with the addition of chloroform water, tube No. 2. It will be found that the carbonic acid will accumulate at the upper end of the tube in No. 1, while in No. 2 carbonic acid will be completely absent, but if tube No. 2 be placed in the open air the chloroform will be evaporated, and the yeast will begin to grow and elaborate carbonic acid gas. This illustrates very conclusively that chloroform does not kill the germ outright, but simply prevents its development. Another well known fact, noting the protoplasmic movement of amoeba after the cell has contracted into a ball, if a mild narcotic be added to the solution in which the cell is suspended, there will be a short stage of an excitation in which the movements are very much accelerated, while in a few minutes the depressant stage will be reached and the protoplasmic mass becomes non-motile. It has been found by a number of observers

that quinine exerts a powerful paralyzing action upon the amoeboid movement of leucocytes.

We will here mention another phenomena that has been observed which consists of the action of the vapors of ether or chloroform, upon the ciliary movements of the cells of the pharyngeal mucous membrane in which the motion was at first accelerated, but a complete standstill of the cilia took place. If the duration of the action was not too long the motion appeared again after the introduction of fresh air.

This necessarily borders upon the line of antiseptics and disinfectants, a subject that will be taken up later on. Some three years ago I took up a line of work suggested by Dr. Loeb, as to the changing certain inorganic salts in the food media, that was, to find out if a process of substitution of one metal ion for another could be carried out, and, if such was the case, which was the most essential to the life function of the bacteria? My apparatus and equipment at that time were not sufficient to carry out this class of work to its ultimate conclusion, but I was able to determine at that time that this phase of the subject was a fruitful field for bacteriological research, and until this subject is thoroughly investigated we will have little conception of the true physiological and pathological processes that go on in the oral cavity.

It is understood that there are twelve elements out of which all living substance is composed, and that these must enter the body of the micro-organic cell through a process known as osmosis. The chemical compounds in which these elements are introduced into the body are as manifold for the various forms of micro-organism as there are species of this living substance. For it has been well shown in the artificial cultivation of bacteria, a general food for all does not exist. When we consider that the fungi stand in a certain measure between the high forms of animal and vegetable life, and that there are immense groups of this low form of life, some of which may only act on nitrogenous substance, whilst others will act better in hay infusion; while those germs that live best on nitrogenous substance might be able to live to a certain extent on substance in which another

germ would set up an alcoholic or acetic or lactic acid fermentation. We cannot speak of specific germs of fermentation, pigmentation and disease, as was one time thought; because, in one case, we may have direct alcoholic fermentation, while in another instance it might be a by-product; acetic acid often appears as a by-product of sugar fermentation.

Bacteria is ofttimes looked upon as having no other function than that of producing disease; that we can state it is not true, or we have comparatively few in number that are truly disease-producing organisms, while, on the other hand, we have a great number whose functional activity seems to be solely that of breaking up dead organic compounds, reducing them to the simpler elements, while a great number has proved to be valuable in the practical application of various industries. Duclaus and Hueppe have also revolutionized the dairy industry. Since the discovery of bacteriology, it has been possible to treat milk in such a way that it is portable for a considerable distance, either by refrigerating it or heating it to a temperature. A very interesting biological phenomenon was discovered in the pasteurization of milk; it was found that milk, heated to a certain point, did not become acid, but was changed to a true alkaline, while if it had not been heated, it would have been acid; this is because the micro-organism that brings about this fermentive process had been so modified as to change its true functional activity in a way that it produced an alkaline milk with a bitter taste. This disagreeable bitter taste was not all, for sometimes a poisonous proteid substance was formed. There was also at times formed in milk and various sugar solutions a substance containing an aromatic odor; this has been taken advantage of by some, and introduced into the dairy business in some countries. The methods that have been used are as follows: Take pasteurized cream and grow the germs in a way that sour cream is produced, and the butter that is made from this cream seems universally accepted as the only true scientific means of producing butter. This method is followed out very largely in Finland and Denmark, with great success. But as we cannot go into the discussion of that phase of the subject here, I can do no better than refer you

to the classical investigations of Fluger, Weigman, Grotenfeld and Kruger. Right in this connection we might mention that in the manufacturing of cheese, the transformation of the casein in a way that an aromatic chemical compound is formed, giving the various flavors to each individual kind of cheese, but if this is not followed out in a strictly scientific manner, a poisonous product is formed, thus giving the characteristic ptomaine poison. The peculiar rancid odor given to butter is due to the oxidation of fats by certain micro-organisms in the presence of light, and the oxygen of the air changing fats into fatty acids, and milk sugar into lactic acid. From the foregoing statement, it might be inferred that most micro-organisms are constant in their functional activities, but heretofore we have called attention to a number of incidents in which their activities may be changed with the slightest variation of nutrition, the temperature and oxygen of the air, etc.

We might say right here that the great interest that is centered around bacteriology has been principally around three processes, namely, disease, fermentation and putrefaction. In the study of bacteriology and its evolution, we find that it has only recently passed from the natural history, and has truly become a scientific subject.

It is through the painstaking research of Pasteur that saved the silk industry of France; it was he who placed fermentation upon a scientific basis, while the name, Koch, will remain inseparable with the tubercle bacilli, and its presence with that dreaded disease, tuberculosis. The true biological relations of bacteria with fermentation and with disease is not, as yet, well understood. We do not know, as yet, the extent of variation that may take place in certain micro-organisms without any change of nutrition; we can almost safely say, if the environment remain the same, such as food and moisture, heat and light, the bacteria remain constant, whether they are disease-producing organisms, or whether they belong to a class known as saprophytes. Those that are known as disease-producing germs are called pathogenic. Now, this property may vary with the changing conditions of the micro-organisms, for, as we have already stated, that the tem-

perature of only a few degrees may change their physiological activities; thus, we see if that activity is that of producing disease, it may change to one wholly incompetent to perform that function, but if transferred back again to that natural environment for that special germ, before it has entirely adjusted itself to the new conditions of life, it will again grow into a pathogenic state, thus producing its specific pathological functions. If a bacterium is placed in an unnatural environment, there are three things that will most likely take place: they will change their form and action and adjust themselves to the new conditions of life, or form spores, so as to be able to preserve the species, until such time when these spores will again come in contact with a soil, having all the chemical constituents necessary for their growth and development. Fitz has given a good illustration of what will take place when a germ is changed from one food media to that of another; for instance, the germ that forms butyric acid out of saccharose, as the chief product, and butyl alcohol as a by-product, while, if it be changed into a media containing glycerine, it will there produce butyric acid, as a normal product, and as by-products it will produce prophyle, glycol and lactic acid. Naegeli, in his early studies of bacteriology, came to the conclusion that the form and action of bacteria varied without limit. Buchner was the first to grow the anthrax bacillus in a way to render it non-pathogenic, and succeeded in making it a true putrefactive germ. Another illustration might be given here, and that is, the staphylococcus pyogenes aureus, when grown on the ordinary artificial culture media, produces a yellow pigment; when injected under the skin will produce suppuration, but if grown in a sugar solution it will bring about a typical lactic acid fermentation. It will be seen by this that this germ has three different and distinct functions, all of which take place under entirely different environments. In growing the bacillus prodigiosus on a media rich in starch, it produces a beautiful red pigment, and if the temperature be raised to a few degrees above the normal, its action is completely changed to that of producing lactic acid instead of the red pigment. The coli bacillus is a saprophytic bacteria in the intestinal tract, and can also produce suppuration,

and also produces lactic acid, when grown artificially in a sugar solution; these are good illustrations of the biological phenomena of many bacteria.

[TO BE CONTINUED.]

GENERAL ANESTHESIA.

(Lecture Delivered by Cassius C. Rogers, A. B., M. D., Before the Senior Class at the Chicago College of Dental Surgery, March 26, 1902.)

The only way by which to come to any satisfactory conclusion as to the results of anesthesia so far as the deaths produced by the different anesthetics are concerned is to study the statistics which have been compiled by men who have gone over them carefully as far back as anesthesia has been known, and find the number of deaths that have been recorded due to the various anesthetics. These statistics are, of course, very crude at the best, for there have undoubtedly been a great many deaths due to chloroform and ether which have never been reported; that is, there are no records of them to be found in medical literature. The death takes place, a few people in the community where it occurs hear about it, and that is all. A record should be kept of every one of these cases; every physician who has a patient die due to an anesthetic should report that case, thereby giving future generations the benefit of knowledge as to the production and results of anesthesias. So far as the laity is concerned, this attempt to cover up the disastrous results following upon the use of an anesthetic may be all right, but so far as the medical profession is concerned, it is their privilege and duty to know as much as possible regarding this subject.

A few years ago what was called "The Lancet Commission," composed of a number of men, was appointed in England to investigate statistics of anesthetics and see if any definite conclusion could be arrived at regarding the mortality resulting from their use. Therefore they went over a great many cases, arriving at certain conclusions. The better way to study this subject is to go over the records of some certain hospital. In hospitals the deaths due to all causes must be reported—*i. e.*, they must appear on

the history sheets of the hospital. Therefore, if we take a hospital which has been in existence for a number of years and go over the history sheets of all the patients who have been treated therein for a certain length of time, say ten years, noting the cases in which anesthesia was produced, the kinds of anesthetics used, the number of deaths resulting from each, etc., we may in this way arrive at more accurate and definite conclusions.

History.—Anesthesia is by no means a new discovery. The ancients knew of it, and it was spoken of in medical literature, but the first record we have was written in the first part of the thirteenth century, and this statement I will read to you:

"When you wish the patient to be relieved of suffering under an operation, take the juice of orpine, eringo, poppy, mandrake, ground-ivy, hemlock, lettuce, of each equal parts; let clear earth be mixed with this, and a potion prepared. When you are ready to operate upon the patient, direct that he shall avoid sleep as long as he can, and then let some of the potion be poured into his nostrils and he will sleep without fail. When you wish to wake him, let a sponge be pounded in vinegar and put it to his nostrils. If you wish that he should not wake for four days, get a pennyweight of wax from a dog's ear and the same quantity of pitch, administer it to the patient, and he will sleep. When you would that he should awake, take an onion compounded with vinegar and pour some into his mouth, and he will awake."

That is the first history we have of physicians giving anesthetics so as to perform operations painlessly. We have no further statement in medical literature regarding the subject until we come down to the nineteenth century. On November 3d, 1846, Dr. Henry J. Bigelow read before the American Academy of Arts and Sciences an abstract of a paper which was published in full in the Boston *Medical and Surgical Journal* of November 18th, 1846, entitled, "Insensibility During Surgical Operations Produced by Inhalation." This is the first definite statement we have in medical literature where a person has been kept asleep through an operation by the inhalation of an agent. Sir Humphrey Davy, however, suggested in 1800 that nitrous oxid might be used to advantage in surgical operations. This is

the first suggestion that we find as to the use of nitrous oxid for general anesthesia; it is not said that it was used, but that it might be used to advantage.

Mr. Hickman, a London surgeon, in 1828 wrote to King Charles X. that he performed operations without pain by producing insensibility by the inhalation of certain gases which entered the lungs. He did not state, however, what these gases were, consequently we do not know, and it may not be true that such a thing took place.

Dr. Crawford W. Long, of Athens, Ga., produced anesthesia by ether in 1842, but before his article was published Dr. Morton, a dentist, gave ether to a patient for Dr. Warren to enable him to perform a successful surgical operation under general anesthesia. Therefore Dr. Morton, a dentist, published the first article in medical literature concerning the production of profound anesthesia, administered for the purpose of performing a successful surgical operation. Whether this was discovered by Dr. Morton or by some one else, Dr. Morton simply administering the anesthetic, medical literature does not state, but to Dr. Morton is given the credit of giving the first reported case of general anesthesia. We know, however, that general anesthetics were given before this time, but there were no reported cases of successful operations. Therefore Dr. Morton, a dentist, gets the credit for the first general anesthesia, but Warren, Hayward, and Bigelow, previous to this time, knew about general anesthesia, their articles, however, not being published. In 1847, four years after Dr. Morton gave his first general anesthetic, general anesthesia had become known all over the civilized world, and has been universally used ever since.

Statistics.—We now come to a few statistics. I know that these are always dry, but to get at the foundation of anesthesia we must know something as to the number of deaths which have been caused by anesthesia.

First, as to the choice of the anesthetic. We have three anesthetics in general use which will produce general anesthesia: (1) Nitrous oxid, (2) Ether, (3) Chloroform.

The first thing to be taken into consideration in the administration of an anesthetic should be the safety of the patient.

We never should give an anesthetic to a patient simply because that particular anesthetic will put him to sleep quickly, if it would be more dangerous to give him this than some other. We *must* take the patient's welfare into consideration first, selecting our anesthetic according to the patient. Certain patients will take ether better than chloroform; other patients will take chloroform much more readily and better than they will ether. Chloroform, we know, will put a person to sleep much quicker than ether, therefore sometimes chloroform is given simply to hurry up matters; a physician or surgeon who does this, however, is not doing his duty by the patient. The physician's time should not be taken into consideration; the patient's health and life should be considered first, and if the surgeon hasn't time to wait for general anesthesia by ether, and if this is the one that should be given, he had better not perform the operation. Use the anesthetic that is safest for the patient *always*.

In this connection let me say that no anesthetic is absolutely safe. Deaths have been reported following the administration of all three general anesthetics—nitrous oxid, ether, and chloroform. In St. Bartholomew's Hospital Dr. George M. Gould, editor of the *Medical News* of Philadelphia, went through the history sheets in the hospital from 1875 to 1890. He found that during that time there were 40,958 anesthetics given in that hospital. Chloroform was administered 19,526 times, with 13 deaths known to be due to the chloroform. Ether was administered 8,491 times, with 3 deaths. Nitrous oxid, followed by ether, was administered 12,941 times, with 1 death. The mortality, then, in St. Bartholomew's Hospital was as follows: With chloroform, one death to every 1,402 anesthetics; ether, one to every 2,830; nitrous oxid followed by ether, one to every 12,941.

Gould went still farther than this. He tabulated, from Julliard's publication, which was taken from Compte's findings, a table showing among other things that in the administration of 638,461 chloroform anesthetics 170 deaths occurred, *i. e.*, one death to 3,749 patients. Ether was administered 300,257 times, with 18 deaths, or one death to 16,675 patients.

Therefore you will see all the way through there are proportionately more deaths due to chloroform anesthesia than to ether, whereby we come to the conclusion that ether is the safer anesthetic.

In 1891 sixty-six European surgeons started investigation on this subject. Of 23,000 chloroform administrations there were only six deaths, or one to 3,776 patients; with ether there were only one-fourth as many deaths. Their findings were as follows: Four and one-half as many deaths due to chloroform as due to ether. We might say, therefore, that according to these statistics ether is four and one-half times the safer anesthetic. We have seen, however, that deaths have followed the administration of both, consequently neither one can be considered as absolutely safe.

In some cases the statistics are much lower, as, for instance, two deaths due to chloroform to one death due to ether, making the death rate following ether administration just half that of chloroform.

The Lancet Commission investigated nitrous oxid anesthesia, finding in all dental and medical literature reports of but seventeen cases of death due to nitrous oxid. Their statistics were as follows: There were on an average two deaths to every 10,500,000 administrations of nitrous oxid. Therefore you see what a low death rate nitrous oxid has. Still, it is not absolutely safe, because in the literature we have reported, as stated, seventeen deaths up to 1891, due to the administration of nitrous oxid, occurred. How many more deaths than this have taken place as the result of the administration of nitrous oxid we do not know, because we have not a complete history. Dentists as a rule keep no record of the number of administrations of nitrous oxid given. Then, again, the deaths that are due to nitrous oxid frequently do not occur at the time it is administered. The seventeen deaths reported took place at the time the nitrous oxid was being administered. Again, it might be that some of these deaths would have occurred without the nitrous oxid, because when we take ten or eleven million people and put them in a chair for anesthesia, one of them might be in a condition to

die; of this number one of them is liable to fall dead at any time. But that is the history of these cases.

Coming now to a more detailed history of the subject of anesthesia, the Lancet Commission give us some important facts. Of 384 deaths due to the administration of chloroform, in 227 cases the pulse failed before the respiration; *i. e.*, the heart failed first. Consequently the deduction was drawn that this result was due to a paralysis of the heart or of the vascular centers. In 77 cases the respiratory and cardiac centers ceased simultaneously, and in 80 cases the respiration failed first. We do not yet have the privilege of taking an individual and chloroforming him until he dies in order to see which stops first, the respiration or the pulse, but the time may come when the criminals who have the sentence of death pronounced upon them can have their choice of hanging or electrocution, or going to science and being chloroformed or etherized until dead. If that time ever comes, then we shall have statistics or results on human beings, and, so far as I am concerned, I would be in favor of that kind of capital punishment, for then the world would be benefited by these men, whereas, under the existing order of things, no benefit is as a rule derived from them.

Stages of Anesthesia.—In the administration of chloroform to lower animals, upon which we may experiment, we find that after the first half minute there is always a lowering of the arterial pressure. The question is, To what is this lowering of the arterial pressure due? (1) Is it due to cardiac vasomotor paralysis, or (2) is it due to the action upon the ganglia within the heart? In regard to experiments made in this connection, Sanson took a frog, spread out its foot, and placed it under a microscope, then chloroformed the animal, and after the first half minute he noticed a spasm of the vessels in the web of the frog's foot, and not until the third stage was there a relaxation. We have in anesthesia three stages—the first, second, and third. In the administration of chloroform death principally occurs at two well defined periods: (1) Right at the beginning of anesthesia, within, say, one to three minutes after commencing to administer the chloroform; (2) in the third stage. Deaths at the beginning of anesthesia are undoubtedly due to a spasm of the

vessels, in which they all contract; consequently the blood is not thrown properly to the heart, and the heart simply stops from paralysis. A case of this kind has only recently come under my observation. A laboring-man, thirty-five years of age, perfectly healthy as far as physical diagnosis could elicit, was examined by a very competent surgeon in this city, and was to be operated upon for hernia. He was taken to the anesthetizing room and the administration of chloroform was started, and within half a minute the doctor who was giving the anesthetic said to the surgeon, who was washing his hands preparatory to the operation, "There is something wrong here." The surgeon turned around and went to the patient, and found that he was dead. This recalls forcibly to our minds the danger there is in anesthesia. Another case was that of a child six years of age, upon whom a minor operation was to be performed. The chloroform was dropped on the mask away from the child's face; when it was brought over the face the child took one deep inspiration of the fumes of the chloroform, and that was the last inspiration she ever took, death being due simply to a paralysis. Those are cases that cannot take general anesthesia from chloroform; they die, and they die so quickly that one can do nothing; it is like a flash of lightning. This might happen to anybody, and these cases are not accidental, as they are classed to be; it is just an unfortunate affair. One happens to have a patient that one can find nothing the matter with, but when the anesthesia is started the heart is paralyzed, and it is all over so quickly that not a single thing can be done. I know of four cases of this kind which have occurred in this city in the past twelve months; how many more there have been is a question which I know nothing of, but undoubtedly there have been others. Of course, there are thousands and thousands of anesthetics given in a city of this size, with practically very few deaths, but if we were to investigate the statistics we would probably find one death to about 4,000 anesthetics. When we take into consideration that, the world over, millions of anesthetics are given, we will see that this means a good many deaths

in a year due to chloroform alone. It would take one man a long time to give four thousand anesthetics, although a physician or surgeon with a large practice would probably give that many, and might give a great many more than that. He might give thousands and thousands of anesthetics and never have a death, while another man, just as skillful in giving anesthetics, would have a number of deaths. There is on record a physician who gave over 16,000 administrations of chloroform without a death. That is fortunate. A man equally skillful might give 16,000 anesthetics and have a dozen deaths. It depends very largely upon the patients that one has, although, of course, it is a science, I might say an art, to give an anesthetic. It takes a man with a level head and one who knows exactly when to stop giving the anesthetic, the patient having just sufficient to keep him under its influence.

Ether, as already stated, is a much safer drug, but the medical profession has not studied its action and effects as they have chloroform. The medical records in regard to it are very meagre as compared with those in regard to chloroform. The conclusions, however, are as follows: At the beginning there is a rise of arterial pressure, instead of a lowering, as in chloroform; in other words, its action in this respect is just the reverse of that of chloroform. This, however, may be followed by a fall of arterial pressure, and it is then that death is produced by the anesthesia. Ether also stimulates the vaso-motor centers and the heart, while chloroform has a depressing effect upon them.

Let us see, then, the time when we will have death taking place in chloroform and ether anesthesias: Generally with ether we have death produced later in the administration of the anesthetic, after the patient is asleep. With chloroform we have it produced at two stages—the first and the third—in the latter of which we have relaxation occurring. You will remember that the vessels in the frog's foot relaxed. The pupils of the eye relax, and the pupils are a very good indicator as to the amount of anesthetic that should be given. In the administration of chlo-

roform we have first a contraction of the pupil, then we have the pupil coming back to its normal position and remaining in that way, the reflex corresponding to light, until the patient is saturated with the chloroform, then we have a relaxation, and the pupil will no longer correspond to light reflexly; it is a large, dilated pupil. This is always a dangerous stage in anesthesia, and it means that the anesthetic must be dispensed with at least for a short time and air given to the patient.

Again, chloroform seems to have a selecting power for the brain; *i. e.*, there is a certain amount of toxin stored away in the brain. In the case of nitrous oxid, if when the patient becomes unconscious the mask is removed from the face, it is only a short time, a minute perhaps, until the patient is perfectly conscious; but in chloroform and ether it takes proportionately a longer time as a rule for the patient to come out from under the anesthetic than the period during which he has been under its influence. For instance, if a patient has been under an anesthetic for a long time, it takes a number of hours for him to become conscious. In the one case there are no toxins stored up in the blood; there is simply a lack of oxygen in the blood, and as soon as the oxygen is supplied to it the patient is perfectly conscious and in a normal condition, while in chloroform and ether there is a storing-up process, and chloroform especially, as already stated, has a selecting action for the brain, because, on examining these patients, more chloroform can be found in the tissues of the brain and in the blood supplying the brain than can be found going in the blood to the brain, and we have a paralysis of the central nervous system, this producing the anesthesia in chloroform and ether. Ether does not have as marked a tendency to accumulate in the blood and in the brain structure as does chloroform, this probably being one reason for its greater safety as far as administration is concerned.

Selection of the Anesthetic.—In regard to the circumstances which modify the administration of chloroform or of ether, how do we know when a patient should be given chloroform and when ether?

(1) We give chloroform in cases of emergency, and where the patient must be put to sleep quickly, and we cannot take the time to put him to sleep under ether; it takes sometimes half an hour to get a patient to sleep with ether, while with chloroform it generally takes only a few minutes. Therefore, when the condition of the patient threatens life, an anesthetic must be given, and the patient put to sleep rapidly, then we give chloroform. I might give an illustration of this kind: Where we have eclampsia, due to uremic poisoning, the patient being in a state where spasm may produce death in a short time, then we use chloroform; the muscles must be relaxed, and the only way to relax them is to put the patient to sleep. If we were to take half an hour to administer the anesthetic the patient would be dead. Therefore in those cases we always use chloroform, no matter what the conditions of the other organs of the body may be.

(2) At the time of parturition we may use chloroform, this having a record of being a perfectly safe drug to use in this condition. This is a mistake, however, because in medical literature there are a number of deaths reported due to the administration of chloroform at this time, therefore it is not a safe drug, even under these circumstances.

(3) In the case of old people, where we have the rigid chest, *i. e.,* rigid muscles, partial ossification of the costal cartilages, etc., it is better to give chloroform, for these individuals stand chloroform better than they do ether. It puts them to sleep quicker, and there is not so much struggling and not near the stage of excitement that is produced by the administration of ether.

(4) In cases of extreme obesity we give chloroform. We know that if we want to remove fat or grease from the hands, if we apply ether it simply dissolves it, and the hands will be easily cleaned, or a grease spot can be cleaned very readily from a piece of cloth by ether. Ether has a tendency to produce nephritis, especially in obese persons; we have emboli, etc.; they do not take ether well, therefore in that condition we give chloroform.

Contraindications.—We have certain conditions which contraindicate the use of any anesthetic.

(1) In organic brain diseases, where we have tumors, lesions, etc. I said that chloroform was stored up in the brain, therefore chloroform is much more liable to produce death in this condition than is ether, yet neither drug is safe where we have a chronic disease of the structures of the brain. An anesthetic should not be given unless there is a possibility of thereby saving the life of the patient when in danger from some other trouble.

(2) In an atheromatous condition of the vessels, where we have arteriosclerosis, any anesthetic—chloroform, ether, or nitrous oxid—is very dangerous, and should not be given unless it is to save the life of a patient which is threatened by some acute disease to which the patient will undoubtedly succumb unless help comes quickly; in that case, if an anesthetic be indicated, you must run your chances. These cases very often succumb to the administration of any of the general anesthetics.

(3) In diseases of the heart (which we will take up at the next lecture) anesthetics should not be given.

(4) In diseases of the lungs anestheisa should not be produced unless it is absolutely necessary; and

(5) In diseases of the kidneys anesthetics should not be administered.

Then we have five conditions that we must look for, and in which we must not give a general anesthetic unless absolutely necessary, and these include nearly the whole body: (1) Diseases of the brain, (2) of the blood vessels, (3) of the heart, (4) of the lungs, and (5) of the kidneys. So if we were never to give an anesthetic to a patient suffering from disease of one of these five organs, probably we would give very few, because nearly every individual who has a pathological condition or who needs an operation will have a disease of one or more of these organs.

In atheroma of the arteries we generally have an atheromatous condition in the brain, the circle of Willis and the other vessels of the brain being affected. Contraction of these takes place under the anesthetic, the high tension on the arteries breaks loose a little of the atheromatous material, and the patient dies

from the breaking loose and the embolus forming in the vessel, on account of the administration of the anesthetic and the consequent contraction of the vessels.

[TO BE CONTINUED]

THE POSSIBILITIES OF PORCELAIN AS A FILLING MATERIAL.

BY W. T. REEVES, D. D. S., CHICAGO.

(*Abstract of paper read before the Michigan State Dental Society June* 9-11, 1902.)

In presenting this subject for your consideration I shall endeavor to show some of the possibilities of porcelain as a filling material—when and where it can be used—how it should be manipulated, and why—and some theories of mine as to why it is the most permanent of all the materials we use today for the restoring of lost tooth structure.

When and where it can be used: To you who are working along these lines I hope to bring some new principles that will stimulate you to a more extensive use of porcelain as a filling material. To you who are looking on from afar, waiting for the experimental stage to pass, I want to say, the time is now here; porcelain inlays are no longer an experiment, they are a proven success and have become a permanent feature in all dental operations.

Conservatism is commendable in all, but when anything is a proven success it is time for all to "get into the band wagon."

When the ability and skill of the operator to successfully complete any given case—and the patient is able to recompense the operator for time and skill expended, then porcelain is "per se" the ideal filling material. I say ability advisedly, for there is no work we do that requires such careful attention to every detail as the making of a porcelain inlay; the slighting or hurrying over of any portion of the work will result in failure; the old saying, "practice makes perfect," applies with great force to this branch of our work. Any one of you would laugh if the student in your office who through observation has acquired a certain amount of knowledge should attempt to fill for a patient any of those cavities

that looked so easy as he saw you do the work; you all know the amount of hard work you did before you acquired the skill in handling gold that makes the filling of difficult cavities today easier than the simple ones were when you began. This applies with double force to the making of porcelain inlays.

The person who in paper or discussion (and there have been a good many who have gone on record in the past few years) says "that porcelain inlays are limited to the simpler cavities, easy of access, in the anterior teeth" occupies the same position as your student would if he should say that gold could only be put in simple cavities easy of access, because his inexperience limited the use of gold to such cavities in his hands. As you acquire experience you will go from easy to more difficult cavities until you become so proficient that the most extensive cavities in molar or bicuspid will be possible in your hands, and then you will restore with inlays teeth that it would have been impossible to fill with gold, and do it with the minimum amount of mental and physical strain upon both yourself and patient. There is no work you do that from start to finish is so easy for the patient as the preparing of a cavity for and the insertion of a porcelain inlay.

Where porcelain can be put: You will conclude from the foregoing that I place hardly any limitation as to where you can use porcelain as a filling material; it can be used in more places and with a greater degree of success than gold. I will briefly enumerate some of the persons for whom and places where porcelain can be successfully used.

Those high-strung, nervous temperaments for whom it is almost a physical impossibility to prepare a cavity even for a cement filling, to say nothing of gold, you can prepare the cavity for an inlay with comparative comfort, and when set you have done permanent work.

For the young, in whose mouths gold fillings fail faster than cement wash out, you will come very near doing permanent work with porcelain inlays.

For those refined, sensitive natures that the extensive display of gold in the front of the mouth is an ever conscious annoyance, you can confer a great benefit and restore to full contour and usefulness the worst broken down teeth, so that persons at close con-

versational range would not observe that artificial means had been resorted to by the use of porcelain inlays.

For the aged, whose strength would not permit of the protracted operation of the insertion of a gold filling an inlay can be made, for if necessary the work can be divided between two or three sittings of comparatively short duration.

For those bordering on nervous prostration you can do permanent work with the minimum amount of nervous taxation with the use of porcelain.

For women during gestation and for the young mother whose maternal duties make it impossible to take the time necessary for a large gold filling—in both of these cases where it has been necessary to temporize heretofore you can do permanent work with porcelain.

To enumerate the different cavities in which porcelain can be used would be to practically name all the cavities that occur from the central incisors back to and including the third molars, upper and lower, so I will only cite a few cases and conditions in which porcelain will do a great deal better service than gold.

In those extensive cavities where decay has encroached so closely upon the pulp that death of the pulp would be almost sure to follow if filled with a metallic filling, although you have lined the cavity with the best non-conductor you know of, porcelain will give you almost absolute security that the pulp will remain alive and the tooth be perfectly comfortable to the patient, for clinical experience has taught us that porcelain is the best non-conductor of thermal changes of any material we have ever used—and practically restores that tooth to as normal a condition as though decay had never occurred.

Cavities on the buccal surfaces of molars and bicuspids at the gum margin that remain sensitive to anything hot or cold taken into the mouth, and cavities on the labial surfaces of the anterior teeth that are sensitive to the drawing in of a cold breath when filled with gold, become perfectly normal when the gold is replaced with a porcelain inlay.

Accidents to the young that result in the breaking off of a tooth, even to the extent of half the length of the crown, where it is desirable to retain the pulp alive on account of the incomplete

development of the root, can be restored to full contour and usefulness with a porcelain tip, and the pulp will remain alive.

Those cavities from which the best inserted gold fillings are being constantly bitten out by force of mastication can be filled with inlays that will stand all the stress that teeth should be subjected to.

How porcelain should be manipulated, and why: High fusing bodies are the best in every feature of inlay work.

I will describe the handling of the different bodies in making an inlay for an approximal cavity in a central incisor extending from the cervical or gum margin to and including a third or half of the cutting edge.

You select some one of the several good bodies that are on the market to build what I call the foundation of the inlay; I use Close body or Brewster's Foundation; have it finely ground, for it will pack more solidly, carve better and shrink less than coarser ground; build it into the matrix little by little, jarring it down well to make it solid, build out the corner in excess of what you expect the contour to be to allow for shrinkage; when sufficiently dry that you can carve it, begin to carve and shape it up—so that you will complete this work before it is dry enough to crumble; carve the lingual surface right down to the contour the matrix gives you, then carve away what would be the labial half of the inlay, carve it away right up to the matrix so that the room for laying on your colors will be the same at the edge of the tooth as any other part of the inlay; bake this and if you have estimated your shrinkage correctly you have practically an inlay for the lingual half of the cavity; if shrinkage has been more than expected build on more of the foundation and bake again; you are now ready to build on the colors you want the inlay to be, and you can vary the shading from neck of tooth to cutting edge at pleasure. I never mix two or more bodies together to vary the shade of one, but depend on the thickness of the layer to give me the shade I want; you can get any shade of a given color by the thickness of the layer you use. I can best illustrate this by showing the effect of holding a sheet of colored glass to the light; you get a certain shade of that color; now, place another sheet back of it and you get a deeper shade of the same color, and by adding more sheets of glass you get a still deeper shade of the same color. It is

the same in using bodies; you can get any shade of a color by the thickness of the layer you use; build your colors on in layers and bake each layer as you go along; when you have built your colors to almost full contour cover the whole inlay with a neutral color that will allow the underlying colors to reflect through; in this way you will get a translucent effect, and it is the only way that the translucency so desirable can be obtained. In the tooth you are trying to match, the colors are all in the dentine and reflect through the enamel; the enamel of all teeth is practically the same color—the different shades of teeth come in the difference in the dentine.

All inlays, whether restoring contours or simple saucer shape cavities, I build up in layers, and never less than three layers—foundation, color, and enamel; an inlay built up in layers accomplishes three objects: the first, a natural looking, translucent inlay; second, an inlay of three or more layers of different body will break up the absorption of light so that from whatever angle or point of view you look at it, it will look practically the same, while an inlay built all of one body or mixture will absorb light all in one direction, and viewed from one point will look all right, but from the opposite point of view will show up as plain as black and white; an inlay built in layers will come very near imitating nature's method of building up a tooth, and, by breaking up the direct absorption and refraction of light rays, will come very nearly looking the same from all points of view; third, you overcome that great bugbear of most inlay workers—the cement showing through after the inlay is set. An inlay built up in layers will prevent the reflection through from underneath of the cement it is set in; you will often hear operators say, "they had a splendid color before the inlay was set," but after it was set the cement killed it entirely; that was because the inlay was all baked of one body and the cement could reflect through from underneath as easily as the light was absorbed only in one direction from above.

The three points I claim for this method are translucency, avoidance of shadow, and prevention of cement reflection from underneath.

In selecting the colors your inlay is to be, note the following: If you see yellow, brown, blue, gray or all of them, hold the shade guide to the tooth and determine the strength of those colors, also

the order in which you will use them to give you the effect you want; make a memorandum of this; for instance, you have a typical light yellow tooth you are making an inlay for; the cavity extends from neck to cutting edge, involving at the cutting edge a third (more or less) of the width of the tooth; Yellow No. 2 on the Brewster shade guide looks to be a perfect match for the tooth, but at the neck you find the yellow a little deeper, with a grayish tinge through the center third of the tooth, and a bluish tinge towards the cutting edge; now you will find on looking closer that the blue seems to reflect through a gray and that there is very little yellow in this part of the tooth. My memorandum would read thus: Patient A; Foundation—Cervical No. 3 yellow; Center—No. 6 gray; Cutting edge—No. 9 blue under No. 5 gray; over all No. 2 yellow with No. 11 for enamel. I would proceed to use them as follows: Build my foundation as described; the yellow, gray and blue would then be put in their respective places and baked as one layer; have the three bodies properly moistened and arranged on the slab so that you know which is which; take as near as you can judge the proper amount of each and place at their respective places; then a slight draw of gnarled handled spatula will draw the moisture to the surface and cause them to run together; cease instantly and you will have a perfect blending from one color to the other; if you continued to jar you would get a mixture instead of blending; allow it to dry and bake. You will find shrinkage will necessitate the building on of more of these colors, and this time, as you want gray over the blue, you will only use No. 3 yellow and No. 4 gray; have the bodies ready and proceed as before; this will still further harmonize your colors because the yellow will extend still further down your inlay and modify the gray that was put on in the central portion, while the blue of the lower third modifies the gray so that when they are all covered with the lighter yellow you have such a harmonizing of colors that you can't tell it from nature's work itself.

If shrinkage causes any lack of contour, and it most always does, and is really to be desired, cover all with a layer of Brewster's XX body; this is a new product that Mr. Brewster has been working at for some time, and he brought me the first to test about two weeks ago; you can't say it is any particular color unless you call it enamel color; so far it seems to fill its mission perfectly.

You now have a complete inlay that I believe comes the nearest to reproducing nature of any means or methods heretofore attempted. A still further artistic effect can be obtained by the use of what I call primary colors. They are as deep as Ivory black, Prussian blue, Van Dyck brown, burnt ochre, etc.; they are high fusing bodies and not paints, but they must be used as paints would be, by putting them on mixed with oil, for you cannot put them on thin enough or smooth enough mixed with water as you do ordinary bodies.

These are a set of colors that were made for me by Mr. Brewster, of Chicago, and are meeting a long felt want. Their use is not confined to inlays, but they can be used to artistically change facings and teeth for all kinds of artificial dentures. Mr. Brewster has now put them on the market in a very convenient form. They are a distinct, separate set from his regular set of bodies. With them you can reproduce that steel blue line you so often see just above the cutting edge, also the tobacco stained teeth and the white and yellow mottled teeth. These effects have heretofore been impossible, but with the primary colors they can be reproduced with life-like naturalness.

Why is porcelain the most permanent of all materials we use today? There are several clinical facts in connection with inlays that are at present unaccounted for: First, practically there is never a recurrence of decay around a porcelain inlay; second, they stay in all cavities, under all conditions, better than gold fillings; third, when in contact with an adjoining tooth they are a protection and safeguard against decay of said tooth.

To the first I will not try to give an answer, only to say it is an established fact, through the observation of all inlay workers, that there is seldom or never any recurrence of decay around an inlay. This fact of itself is enough to place porcelain among the first as to permanency.

Second—Here is where we have so many doubting Thomases; it seems almost impossible for a dentist to conceive of any other law of physics other than the law he has been brought up on, that of self-retentive form of cavity, and interlocking form of filling material—and almost equally hard for the majority of inlay workers to get away from that same law.

In the April issue of one of our leading dental journals was printed a paper that was read before two dental societies in which the author gave his conception of a cavity formation that would be interlocking against lateral stress. There are others that are working along these same lines. This is a useles waste of time on the part of the operator and a needless infliction of pain upon the patient. Still others are baking into inlays platinum pins and loops for the purpose of retention. It has been a number of years since I abandoned this practice; this came about through having a tooth so sensitive that it was impossible for me to cut the pit for the pin to set in. It was a case in which an inlay was indicated and I made one without a pin in the cutting edge, trusting to luck that it would stay; it staid just as well as any that had pins baked in. This set me to thinking, and the result was that I abandoned all such means of retention. It took me longer to get away from the idea that I must undercut the cavity before setting the inlay, and undercut the inlay as far as possible. It is about three years since I abandoned this practice, and I believe that clinical experience has taught me the true principle of inlay retention—close adaptation in all parts of the cavity and the cement setting under pressure.

It is exactly on the same principle as a joiner joins two pieces of wood; he prepares the surfaces to be joined so that they are in perfect adaptation to each other, and, placing glue on these surfaces, places them in a vice or clamps them together under as much pressure a he can until practically all the glue is squeezed out, and leaves it to harden, and the less glue there is the stronger the joint. This, I believe, is the true principle upon which inlays depend for their strength of retention. It was formerly my practice to score the reverse side of the inlay with a knife edge carborundum wheel, removing as much of the glaze as possible, but often inlays were of such size and shape as to make this extremely difficult. It has become my practice for some time to etch the reverse side of all inlays with hydrofluoric acid; this removes all the glaze, leaving a roughened surface, but does not alter the close adaptation the inlay must have for the interior of the cavity as well as at the margins.

Third—When in contact with an adjoining tooth they are a protection and safeguard against decay of said tooth. I have

always contended that an inlay should never be ground on any surface other than the occlusal surface after it is set; if any grinding is necessary it should be done before the matrix is removed and glazed again in the furnace.

The approximal surface of a gold filling or crown, no matter how highly polished, will retain its fine particles of food settlement that are an exciting cause of decay. The natural enamel is easily attracted by the acids of fermentation and soon becomes roughened and holds increasing amounts of food settlement and decay follows. Glazed porcelain will not retain food deposit and is not affected by the acids of the mouth. Therefore the approximal space or contact point that one surface is restored with a porcelain inlay, lessens by more than half the liability of decay of the adjoining surface, while if the restoration had been by gold filling the liability would have been increased over the original conditions, for gold soon becomes tarnished and retains collections in excess of enamel. These, I believe, are sufficient reasons to establish the claim that porcelain is the most permanent of any filling material we have to restore lost tooth structure.

NOTE—The subject of Porcelain Inlays will be continued in the next issue of the AMERICAN DENTAL JOURNAL.

CAPILLARY ATTRACTION.

An Equation in Gold and Amalgam Fillings.

BY AUSTIN C. HEWETT, L. L. B., M. D., CHICAGO, ILL.

Failure in accomplishment oftener suggests re-choice of material, or of method, than abandonment of enterprise.

Experience, a barricade in the path of the simple, is but a solid stepping-stone in the upward way of the wise.

He who casts aside the good, because it is not perfection, would as logically reject gold because of dross, or diamonds "in the rough."

I think it needs no argument to prove that recurrent-decay usually, though not invariably, follows the best operations in dental repair with either gold or the so-called (old formulæ) amalgam. Dr. Conrad of St. Louis, Mo., a skilled gold operator, as I can testify from personal observation, also a very close

observer, says that an amalgam filling "will always show recurrent decay within four years."

Dr. G. V. Black has stated that "the average usefulness of amalgam fillings does not exceed four years."

Dr. E. K. Wedelstaedt, who as a student and operator needs no commendation from me or others, says, "We now know definitely when a cavity in a tooth is prepared and filled without altering the conditions which led to the first decay that it is but a question of time before recurrence of decay takes place." "Where there is not an alteration in the conditions which led to the disease an opportunity is left." "In such cases it is simply useless to do the work, for failure is but a question of time." As is his habit he speaks and writes vigorously. He does not hesitate to say "spade" when that is what he means. A fair interpretation of the able article on amalgam (American System of Dentistry, Vol 2, p. 218 it seq.) supports the theory of general "Recurrent decay" sooner or later. I doubt if there are not some of my readers who have been pained to observe their own honest endeavors thwarted within a brief period.

I have not the courage to assert that like experiences have not been mine, with both gold and amalgam.

I do not understand the gentlemen to mean that gold and amalgam as fillings are valueless. I do not consider them so. On the contrary I believe that such gold and such amalgam work is of vast value; worth all of skill, nerve force, and vitality expended by operators, and all the money paid by patrons. I am proud to know that some of my operations have lasted, apparently preservative for twenty, forty, and in one case, fifty years. Other operators have a more just cause for pride, perhaps, than I. We all know that in certain cases years, many years, elapse before failure is pronounced against us; but, alas, the best of operators are forced to feel that life-time successes are the exception; recurrent decay, all too soon manifest, is the rule—some of our achievements in which we had at first the most pride the soonest brought us heart-breaking disappointment and chagrin.

From records carefully prepared and kept of my gold operations, covering fifteen years, previous to the ten years hereinafter mentioned, the average time of fairly preservative fillings

(except in sulci of teeth) did not exceed five years. Recorded operations of other gold workers gave no greater encouragement.

The late and lamented scientist, W. W. Alport, once gave for answer only a pained expression of face, and dubious shake of his head to my question, "What do you think of cohesive gold work?"

Very much has been spoken and written explanatory of such failures, many schemes devised as remedies. "Extension for prevention," which with its rythmical swing has happily caught and directed attention of young dentists to methods of cavity preparation practiced before many of them were born.

The author of the catch phrase will not, and his warmest friends dare not, claim that recurrent decay is not still, and in spite of "extension for prevention," all too prevalent.

It is not the design of this paper to review what has been spoken and written concerning causes of caries in teeth, primary or recurrent, but to bring forcefully before you readers as I may, one cause hitherto unnamed as far as I know; one fully the *"equation"* of any and all causes combined—I mean *capillary attraction.* I have hitherto hinted at it in private conversations, discussions at conventions and in the journals, but those hints were tentative rather than assertive or argumentative. As a result of much study and careful experiment I am thoroughly convinced that no one other factor is more potent in perpetuating caries once begun, or in causing recurrence to thwart elaborate efforts and costly undertakings at permanent repair in teeth. Thus believing, I find great consolation, and cause for encouragement. I was honest and earnest in my labors and the failures caused me deep regret. That I did not sooner detect this cause and learn a remedy, as I believe, may be in part excused because of my environments, and because I was not endowed with omniscience. For the consolation and encouragement of my readers (if any have had failures) I say, and wish to be believed, that for the last ten years (now nearly eleven) recognizing said equation and applying the remedies which I will give you, I have not found a case of recurrent decay or failure, either in gold or amalgam fillings. Others may have found them but not to my knowledge. Ten years are not twenty or forty; but since the date of my present theory and practice successes have been gratifying. I hold no patent for opin-

ion or practice. If I can aid you as I have been helped I shall feel as though I have not lived in vain. Beside when the explanation is made clear, and the practice plain as I hope for, there is nothing wonderful or passing belief.

WHAT IS CAPILLARY ATTRACTION?

Webster gives it, "Attraction causing a liquid to rise, in capillary tubes or interstices, above its level outside, as in very small glass tubes, or a sponge, or any porous substance, when one end is inserted in the liquid; it is a condition of cohesive attraction." He does not nor does any other lexicographer measure its tremendous, almost resistless force; nor show how cunningly the great Artificer has devised methods, valves, cut-offs and anastimoses to aid its exercise of resistlessness. Listen to your memories as you turn the leaves of your "Advanced" Natural Philosophy and recall the hydrostatic pressure of a column of water a half inch in diameter and 100 feet in height. Did you ever try the experiment of "gas-pipe and barrel," the former 100 feet high and the latter "oaken staves," "iron bound?" As you get the column of water 50 to 75 feet high, do you remember how the water would ooze, bubble, hiss and strain at head, stave and bung? As you doubled the height of the water column, did you think yourself safe from douches, to say nothing of oaken splinters? Then go with me in imagination to the Mariposa Valley. Stand at the foot of some giant Sequoia, look up and up two, three, four hundred feet; reflect that thousands of perpendicular tubes of soft wood are filled with water drawn through absorbing rootlets, into and along huge roots-foot arms of the giant, under tons of rock and earth, thence up and higher to the topmost cone-laden needle decked boughs; answer me is there not strategy of method and power nearing the illimitable in capillary attraction? Do you believe for a moment that the hydrostatic force of the heart muscle drives the red and white blood of the human supply through miles of arteries, veins and capillaries into tubules of dentine among enamel rods of teeth, medullary and cancellated osseaus tissues, synovial membranes and ligaments, into nails and hairs among reticulæ of glands, follicles and nerves, unaided by capillary attraction?

Try these experiments. 1st. Suspend a dried piece of ivory (first weighing it on diamond scales) one end for about one inch immersed in water; the rest of the ivory above water wrapped in rubber dam to prevent evaporation. Keep this lower end inch submerged for about two weeks. Then re-weigh the ivory, noting the difference in weight.

2d. Procure a sound cuspid tooth that has been extracted, laid away and dried; weigh, wrap, suspend the tooth and immerse the crown to near the gingival border line of enamel; take care not to moisten or submerge any portion of dentine; macerate the cusp for a week or ten days, then wipe cusp dry, re-weigh and note what you find.

If you doubt the permeability of dried ivory and enamel, after the foregoing tests, select a tooth with approximate cavity, recently extracted. Excavate the cavity *secundum artem;* provide "extension for prevention;" bevel borders. Absorb moisture from tubules and enamel rods with chloroform, or absolute alcohol; dessicate with hot air, and with the best of brain, fingers and endurance fill the cavity with gold, or some silver-tin alloy; place that filled tooth in artificial saliva, keep the tooth in the same at a normal body temperature for a week. Then remove tooth from said fluid, wipe surface dry, cut or break the tooth to dislodge the filling. Apply the microscope and see if you can find a spot in the cavity void of moisture. You all know without a special experiment that if you wish to pare your toe or finger-nails easily a warm foot or hand bath will soften the nails and render the cutting easier. To get an "easy shave." a good lathering (soaking) for the beard will aid the barber's dull razor and prevent profanity. Do nails and hairs *"leak"* as we say a poorly executed filling does?

After these experiments read the directions of Black, Johnson, Miller, Ottalingui, and I'll not forbid my earlier articles. Place them aside of the teachings of scientists who aver that when moisture foreign to dentinal structure penetrates, microbes abound and decay is imminent, and wonder if you can, at recurrent decay.

I frankly confess to you that in view of my experience gained by my failures and by such other investigations, the deepest sympathy of my nature goes out to the young man battling

with the seemingly impossible; I am astonished not at his failures, but at his successes.

Perhaps Drs. Black, or Johnson, or Ottalinqui can beat gold, with flat-footed, serrated pluggers onto tabulated dentine, and enamel rods so closely that all access of moisture is excluded at *all points* of angle and border, but I frankly confess that I never could, by any process then known to myself, or described by them or either of them. The microscope is a wonderful revealer of defects.

Another fact familiar to you all, but so far as I am informed one which has never been named or noted in connection wtih decay, primary or recurrent, is whenever cuticula, enamel or dentine is broken, or tubule mouths are opened by decay, curetting or burring, there is no outflow of "exudate" or "plasma" known and named by hystolytic writers, which bear the least resemblance to the repair or healing processes in wounds of other parts of the human anatomy. We obtain no such reparative assistance from nature.

Let me suggest to you for a moment, the *problem you have to solve* and then recall this equation "capillary attraction;" give it its full weight, or your neglect may tell against your operations, in failure, as disheartening as many of mine have been.

The cavity to fill, a distal; approximating an inferior third molar in situ, cavity extending below the gingival enamel line; occlusal enamel entire and strong. Middle and gingival thirds of buccal and lingual enamel walls thin. Patient, with eyes coal-black or "buttermilk" blue; mouth made after the pattern of a German carp, or a *Grande Marias* sucker; muscles of the mouth like strained rubber bands—use "extension for prevention" galore, apply and screw home double inclined planes for separation, regardless of pain and inflammatory sequalæ then proceed to fashion, anchor and coapt artificial dentine and enamel (gold). imitative of creative strength and impermeability, using serrated flat-footed pluggers, as taught by the distinguished gentlemen I have named and by other gold workers whom I might name, or if you prefer use any of the so-calltd "silver-tin" alloys that do not even claim to carry germicidal or antiseptic prophylaxis.

Now I assert with out fear of proof in contradiction that the man does not live who can, nor has he lived who could build gold in such a case and position (and there are many worse) so densely and so closely upon tubules, enamel walls and borders that moisture could not permeate the gold to some extent, and creep between it and tooth structure; drawn thither by the wonderful force I have tried to describe—*capillary attraction.* To convince yourselves that I am correct, fill such a cavity as I have done following the teachings of authority. Leave it a month or longer then extract the tooth as I have done, break open the tooth, apply the microscope and learn, as I have learned.

Try another very simple experiment. Take two teeth recently extracted. On the side of each grind a smooth concave depression. Leave no under-cuts or parallel walls, grooves or pits. Take of amalgam (such as I shall describe) and with a smooth shot point burnish a film into the concavity of each, as glass is coated for a mirror. Extend the film on to dentine adjacent to the cavity. Do the burnishing well and artistically, grinding a film onto their entire surfaces, then fill both. Drop one into water; leave the other on your bracket. At the end of a week remove both fillings. A similar experiment taught me the lesson I shall not soon forget.

Are we then without hope! I tell you no! a hundred times *no!* I believe that the old English common law maxim *"Never a wrong without a remedy,"* is as true in dentistry as in law. I believe in attacking the wrong—seeking and applying the remedy.

I *believe* I have found *a* remedy for the defects incident to the case I have given you. Please denote the emphasis on the word *"believe."* I can only cite proof for a period of little less than eleven years.

I hold no patent on the remedies. I wish I might give you more and furnish longer proof.

I do not approve of gold work in such cavities as I named. especially since an amalgam such as I shall describe is obtainable. If gold is to be used then not gold alone but combined as hereinafter described, with resin and amalgam films.

Now please understand me: I do not condemn gold, I commend it as useful and durable in the sulci of cuspidate teeth and other cavities accessible to vision and instrumentation, and

compatible with human endurance on the part of the patient and operator. I do not believe in the wisdom of attempting the impossible.

Do not understand me as underrating the teachings of the eminent men I have named. I approve of "extension for prevention," and hold in high honor the men spoken of. I do not approve the flat foot plugger nor have I since I discovered its defects and devised and made a set with oval faces cut in but one direction, and that nearly twenty years ago. I am an enthusiastic admirer of the Royce pluggers and of his mode of using them. By his method *perhaps* hermetical sealing can be accomplished. I would like to see a microscopical test of his method.

But to the remedies. In such a case as I have described use *amalgam*. Not of any of the group of old time "silver-tin;" not one of them, "white" or otherwise, claim to possess antiseptic or anti-microbic properties. Select a "white alloy" that is distinctively germicide, antiseptic and prophylactic—that has a crushing resistance of nearly 1,000 pounds, and consequently great edge strength, one absolutely unshrinking and that can be burnished into place to stay.

As to cavity preparation I need make no suggestion, except to say, follow the best and approved methods; seek success. When ready coat floor, angle and wall with a varnish of resin (from Pinus Sylvestris, I deem best) cut in absolute alcohol; resin 2 dr., alcohol 1 dr. Allow the varnish to dry a few seconds, then with a shot point (smooth) burnish on a film of amalgam to every line, angle, spot and border of the cavity, *enamel edge* and all, as glass is coated for a mirror. Do this well as a preliminary to *building* the amalgam plug.

This may seem but a simple affair, but it is important. The resin mixed with the amalgam and ground, *"planished"* on to border, wall and over tubule mouths has for nearly eleven years defied moisture, repulsed the assault of so persistent a force as capillary attraction.

In the same way a coating of varnish of the same (which by the way is largely antiseptic) spread upon a cavity as aforesaid, and a film of amalgam ground into it as above described, gives a foundation for gold work with all the essentials that for more than ten years has brought *success* to me, and this without

any blackening borders, dark lines or cleavage so dreaded by the gold worker.

Are these simple methods? Are they adequate to the resistance of a mighty force? I have asked myself the question many times. I have doubted and to assure myself repeated the experiments, re-examined my work, always with the same result. I show a cut of two teeth filled as I have directed, using varnish first, burnishing on a film of amalgam next, then adding amalgam to complete the work (Fig. A.). The teeth were one left the other right inferior third molars of a young lady.

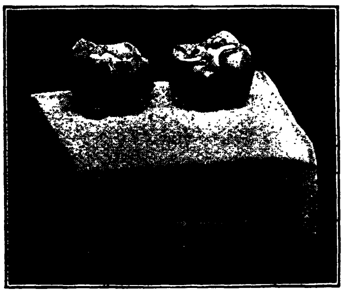

FIG. A.

The occlusal sulci of each tooth being the seat of decay and repair. Six years later the patient returned with her mother to have the same teeth extracted. When the teeth were filled the buccal surfaces were sound, but with the passing years both had developed buccal cavities from crowns to gingivæ, exposing the pulps of each. Unusual development of strong teeth anteriorly, together with conditions of decay, indicated extraction, an operation which both mother and daughter urged, and one to which I was not averse, as I thereby gained fine specimens of my work. The central (sulci) fillings are perfect; the dentine is perfectly preserved that is adjacent to the amalgam, even to very thin films in several places. For retained polish of surface, unchanged color of fillings and tooth structure, the absolute absence of shrinkage or spheroiding, and for continued close coaptation of amalgam edge tó enamel borders, there is to my mind the most convincing proof of value of alloy and processes chosen that I have ever met, and my experience has been an unusually lengthened one. In this case the amalgam chosen has proven itself

a worthy preservative. In that I am not mistaken. The method certainly was not harmful.

But, some may say, the film of resin left by the alcohol evaporation is a friable one, brittle and has no strength. I grant it, but when you come to burnish down upon and among the resinous particles an amalgam composed of granules, minute nuggets of metals insoluble in mercury while crystallizing, then the weakness becomes strength by aiding to fill up the interstices of the crystalline mass superimposed. You may argue that a mortar of lime, sand and water is brittle when water is evaporated; so it is, and the laying of bricks in such mortar is a very simple process, but none of you that thus argue would trust yourselves in a house builded of bricks without the mortar.

What would you think of a hydrostatic or hydraulic engineer who while constructing an aqueduct should refuse to spread a film of Portland cement upon his granite blocks because it is a simple proceeding and the cement thus used is not as strong as granite? You all know that his conduit would leak. So I know that gold, a solid beaten down with never so much care and skill on to dentine and enamel leaves an interstice that leaks, so to speak. "Silver-tin" alloys leave just such interstices.

Clay is a simple, very common material, but when driven down between two rows of planking reaching to the river bottom helps to form a coffer-dam, impervious to water. Will you urge against its use because the clay is a simple substance weaker than hemlock or oak? Wise builders choose materials and processes that lead to success and durability. Are dentists as wise?

In another article, if desired, I may point out some of the adverse influences of capillary attraction and repulsion met in everyday bridge, crown and inlay work; and show a co-relation of those forces and loosening crowns, bridges and inlays.

THE POWER OF ASSOCIATION.*

BY DR. JONATHAN TAFT, CINCINNATI, OHIO.

Never in the history of the world has there been so great a tendency to bring together the forces of nature and make them operative for the accomplishment of great achievements as now. The objects to be accomplished by such aggregations are various.

*Read at the first annual clinic, School of Dentistry, University of Illinois, March 26, 1902.

This is in a marked degree true in regard to mankind; not only is this true of men everywhere, but of the lower orders of living beings. The larger number of the animal creation live in companies, herds, flocks, etc. Some in large numbers and others in less, as the conditions in which they exist may require. Not only do the beasts live in associations, but the birds of the air and the fish of the sea and the insects as well. We will not here and now attempt to give the reason for nor an explanation of this almost universal tendency to aggregation on the part of the animal kingdom further than to say it is for the accomplishment of purposes that could not be reached except in this aggregated state. In the career of our race men have associated themselves together for a great variety of purposes. *In cities* for commerce, self-protection, social life and mutual helpfulness. *Into armies,* for self-defense, the protection of rights, the punishment of enemies and the attainment of spoils. In the human family the matter of association has been carried to a degree of accomplishment that is not to be found elsewhere.

In nearly every department of human occupation united or combined effort is the order; indeed, in many directions but little can be done without it. *The men of wealth* form their associations for commercial purposes and as a means of increasing their possessions. *Those without wealth* unite in communities or bodies in order that they may the more successfully resist and overcome dangers that are present or prospective. All associative efforts are established and brought into operation because of some real or supposed benefit to be derived therefrom, and this oftentimes irrespective of the kind of benefit. It may be *financial, commercial, honorary, political, religious, scientific* or *social.*

We will now give attention for a few moments to the organization of dental association work and note, if we may, somewhat of its influence upon the various agencies that have been instrumental in the development and growth of dental science and art in this country.

For two or three years prior to 1840 Dr. Horace H. Hayden, of Baltimore, became greatly interested in the idea of dental association. He spent much time in traveling, visiting and corresponding with his professional brethren throughout the country in reference to the formation of a dental society. He was enthus-

iastic in his effort in behalf of this object. It seems that but few members of the profession had been giving any thought to this question. When the formation of a society was first suggested it was scouted by many as impracticable. Various objections were raised and unexpected obstacles thrown in the way. One was unwilling to impart from his store of knowledge, which he gave himself credit of possessing, to the others of the profession of merely creditable pretentions. "A community of knowledge? Oh, no!" says another, "I can never consent to that." A third says, "I am no society man," and a fourth objects on the ground "that it would be likely to bring him into contact with those whom he supposed occupied a less lofty place in the temple of professional fame than that he had attained." As for being benefited himself by an interchange of views, the idea was not to be thought of. It was preposterous. He had already drank to deeply from the fountain of knowledge to learn more, and was unwilling to bestow any part of his choice and invaluable treasure upon others.

Thus it will be seen that, as this subject was projected, and chiefly by Dr. Hayden, there was quite a variety of views and dispositions in regard to it. Some were aggressively opposed, others were quietly opposed; others were totally indifferent, while others were mildly favorable. Still others, a small per cent, however, were enthusiastic for the organization. The society was formed and its chief projector was Dr. Hayden, who was elected its first president. This subject is one that had long been considered by him, he having been a member of the profession for forty-three years, and as a man of science and an eminent practitioner none stood higher, either in this or any other country. However distinguished a reputation he may have gained as a dental practitioner or as a man of science, the carrying into successful operation of this enterprise will secure to him a fame that will outlive and outshine even that. When he will have been forgotten as a dental practitioner he will be remembered by his professional brethren as the *"Father of the American Society of Dental Surgeons."* Prominently connected with the society also are the names of other distinguished men, those of Harris, Flagg, E. Parmly, Gardette, Solyman Brown, Harrington, Baker, J. Smith Dodge and others that will never be forgotten.

This was not a delegated body, but those desiring to become members presented their applications or came by invitation. The qualifications of proposed members were well known, or investigation was had for determining their fitness.

There were fifteen persons actively present at the organization. Two were present by proxy, thirteen by letter and twelve by invitation, making the whole number especially interested in the organization less than fifty. The objects of the society, as stated in the constitution, are to promote union and harmony among all respectable and well-informed dental surgeons, to advance the science by free communication and interchange of sentiments, either written or verbal, between members of the society, both in this and other countries; in fine, to give character and respectability to the profession by establishing a line of distinction between the truly meritorious and skillful and such as riot in the ill-gotten fruit of unblushing impudence and empiricism.

Name—The American Society of Dental Surgeons.

Requisition of membership—Each and every acting member of this society shall either have been such by virtue of his attendance in person, or by proxy, or by letter, at the time of its organization or shall be afterward elected as prescribed by this constitution, and subscribe to the same.

Each and every acting member shall be required to attend the society at least once in three years, unless excused by the society.

This was the pioneer in association work in the dental profession. Prior to it two efforts were made to establish local societies, but without any apparent results, one in New York City and the other in Virginia. This association demonstrated quite fully points attainable by associative effort, and as clearly indicated some points of danger that should ever after be avoided. In both of these respects it accomplished a valuable service. After a varied career of sixteen years it was disbanded and has left a record that will never be forgotten so long as the profession shall maintain a distinctive name and individuality.

The American Dental Convention.—This body was organized in Philadelphia, August 2, 1855, in pursuance of a call of about sixty dentists.

The American Dental Convention was formed with a view to a more popular and less restrictive body than the American Society of Dental Surgeons, not, however, for the purpose of antagonizing the latter. In specifying the objects of the convention the second article of the constitution says: "The convention is intended to promote professional and personal intercourse among those who are engaged in the cultivation and practice of dentistry throughout the world; to advance the cause of dental education, and systematize and strengthen the efforts of its friends, and mutual interchange of opinions and experiences, to advance the knowledge and liberalize the relations of the members." Article third says: "The convention shall consist of the members or of those who shall sign these articles of association, and of such other practitioners of dentistry and auxiliary branches of science as shall hereafter be elected for membership and sign these articles."

Article four says: "Candidates for membership shall be nominated by a member of this convention at any of its meetings, and every such candidate as shall receive a majority of the votes cast upon the question of his admission shall be declared duly admitted."

Article five says: "This convention shall be held once every year on such a day and at such place as the convention shall at each session appoint for the next meeting."

The principal promoters of this organization were men who stood high in the profession. The following are the names of those who were the more enthusiastic and active in forming the convention: Elisha Townsend, of Philadelphia; Dr. W. H. Goddard, of Louisville, Ky.; Dr. W. H. Dwinell, of New York; Dr. S. P. Miller, of Wooster, Mass.; Dr. Potter, of Connecticut; Dr. Bonsall, of Ohio; Dr. C. O. Cone, of Maryland; Dr. J. S. Clark, of New Orleans; Dr. Munson, of the District of Columbia; Dr. Garrett, of Delaware; Dr. A. C. Hawes, of New York; Dr. J. G. Cameron, of Ohio; Dr. Marshall, of New Jersey; Dr. Chapin A. Harris, of Baltimore; Dr. Jas. Taylor of Cincinnati, Ohio.

This convention was especially efficient in the promotion and extension of social results. Many close and lasting acquaintances and friendships were formed during its career. Men who had never met or even heard each other's names were through the

agency of this body brought into close companionship and in many respects became professionally helpful to each other. Indeed, the character of the convention and the reputation it attained were such as to draw men of the more congenial natures to each other.

During the career of this body quite a large number of excellent papers were read and, in the main, thoroughly discussed. This convention rounded out a career useful and valuable and was disbanded in the year 1874.

The American Dental Association was organized at Niagara Falls August 3, 1859. Dr. W. W. Allport of Chicago was chosen chairman and J. Taft of Cincinnati secretary. The call for this meeting was as follows: "The undersigned practitioners of dentistry, believing that a National Association of Dentists composed of delegates from State, county and local societies and dental colleges would be calculated to promote the best interests of the profession, respectfully suggest to the dental societies and colleges throughout the country the propriety of electing delegates to meet in convention at the Falls of Niagara on the first Wednesday of August, 1859, for the purpose of forming, if the assembled delegates shall deem it expedient, a National Association upon a representative basis." Dr. James Taylor, W. M. Wright and J. L. Susserott were appointed a committee of three to examine and report the credentials. Upon examination the following persons were found to be duly authorized delegates and present:

Mississippi Valley Dental Association—S. L. Hamlin, H. McCullum.

Ohio Dental Association—H. A. Smith, Jos. Richardson, J. T. Toland, J. Taft, G. W. Keeeley, Geo. Watt, E. Taylor.

Pennsylvania College of Dental Surgeons—Wm. Calvert.

Western Dental Association—D. W. Perkins, W. W. Allport.

Pennsylvania Association of Dental Surgeons—J. H. McQuillen, J. L. Susserott, T. L. Buckingham, Geo. T. Barker.

Indiana State Dental Association—J. F. Johnston, A. M. Moore, P. G. C. Hunt.

St Louis Dental Association—H. J. McKellops, I. Forbes.

Pittsburg Dental Association—W. M. Wright, R. Vandervort.

Cincinnati Dental Association—C. H. James, J. G. Cameron.
Ohio Dental College—James Taylor.

The following was then offered by Dr. J. H. McQuillen of Philadelphia: "Resolved, That a committee, composed of one member from each delegation present, be appointed to draft a constitution and submit the same to the convention, its final adoption to be left until the next annual meeting."

Several amendments were offered, but the original resolution prevailed, with a slight modification, moved by Dr. J. F. Johnston of Indiana, that the committee should consist of three members. Drs. J. H. McQuillen, Wm. M. Wright of Pittsburg and Jos. Richardson of Cincinnati were appointed the committee.

The delegates met according to adjournment. The committee on constitution for the proposed association was called upon and reported, after which the report was read. On motion.

"Resolved, That this association holds its next meeting in Washington City on the last Tuesday in July, 1860, at 12 m." On motion,

"Resolved, That the association suggest to the dental practitioners residing in sections of the country where there are no local or state societies the propriety of forming such association and electing delegates to meet this convention at its next meeting."

On motion of Dr. Taft:

"Resolved, That five persons be appointed by the chairman to prepare essays to be read at the next meeting."

Adjourned to meet at Washington City, D. C., on the last Tuesday of July, 1860. J. TAFT, Sec.

EXTRACTS FROM CONSTITUTION.

ARTICLE II.—OBJECTS.

The objects of this association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them mutual improvement, social intercourse and good feeling, and to collectively represent and have cognizance of the common interests of the dental profession in every part of the United States.

ARTICLE III.—MEMBERS.

Section 1.—The members of this association shall be exclusively practitioners of dentistry, holding their appointment to membership either as delegates from local institutions or as permanent members.

Section 2.—The delegates shall receive their appointment from permanently organized dental societies and dental colleges in the Union, each delegate holding his appointment for one year.

Section 3.—Each local society shall be entitled to send to the association one delegate from every five of its active members, and the faculty of each college to send one of its members as representative.

The work of the association is in the main accomplished through a series of committees appointed annually, as follows: (1) The Committee of Arrangements. (2) The Committee of Publication. (3) The Committee on Prize Essays. (4) The Committee on Dental Physiology and Dental Chemistry. (5) The Committee on Dental Pathology and Surgery. (6) The Committee on Mechanical Dentistry. (7) The Committee on Dental Education and Dental Literature.

In 1897 the American Dental Association held its meeting at Old Point Comfort, August 3. The matter of reorganization and union with the Southern Dental Association and revision of the constitution was taken up. The union of the two bodies was consummated very satisfactorily. The constitution was changed and amended in various particulars. Many things were eliminated that had become more or less obsolete, and many other points amended to make them more in harmony with and better adapted to conditions that now prevail.

To enumerate all the important work accomplished by the Dental Association in its career would be impracticable, or even to give a resume of it. A few things may, however, be mentioned. As its name indicated, it was in the best sense a national institution. Its membership is drawn from all parts of the country. Being a delegated body, it was in touch with every subordinate body in the country, and over these it exercised a fostering and inspiring helpfulness. About 1875 a committee was appointed, whose duty it was to organize dental societies wherever practicable; to visit and strengthen the weak and to encourage and incite

all the more energetic action. Many new societies were organized and feeble ones strengthened under this arrangement. Our educational institutions were helped, strengthened greatly by dental societies, and especially by the one now under consideration. It was ever ready to commend and encourage every movement in the line of progress. It was ever ready to advise as to modes of procedure whenever occasion called for it. There was never decidedly an advanced step made in the way of advance that did not meet the hearty approval and support of this body.

The literature of the dental profession, especially the journalistic department, would never have attained its present proportions without the aid of our dental societies. Take away from our literature all that has come to it through society work and it would be largely shorn of its present very efficient position. About the year 1869 the American DentalAssociation adopted a code of ethics for the regulation of professional conduct. This for the benefit not only of the active members of the association, but for the members of all societies represented in the body. No local or State societies were permitted to send delegates without first having adopted this code of ethics. The influence of this requirement cannot be estimated or fully appreciated. It is an influence that has reached not only every State and local dental association of this country, but it has influenced for good, to a greater or less degree, thousands of practitioners who have never allied themselves to society work. The adoption of this code by State and local societies conferred no power to make its application general. This ability, however, the American Association did possess, and also the courage to exercise it. No society, either State or local or individual, who desired to be in harmonious relation and full sympathy with the profession could refuse to acquiesce in this requirement. This association, from almost the beginning of its career, not only gave attention to the scientific aspect of practice, but to the artistic and clinical as well.

Clinics have been held under its auspices at almost every meeting, which resulted in inestimable value to the members.

At the meeting at Old Point Comfort, for reorganization,the name was changed to that of National Dental Association. In amending the constitution all the good things contained in it were retained and some of them, at least, emphasized.

In the rules for order in the new constitution is the following:

"Resolved, That this association now in session direct that sections belong thereto shall in the future be prohibited from inviting individuals who are violating the code of ethics to hold clinics or to give other exhibitions before this body."

At the first meeting of the reorganized body the following was adopted:

"Resolved, That a committee of three be appointed, whose duty it shall be to confer with State and local societies and to aid and foster new societies when and where desirable." At this first meeting also, twelve standing resolutions were adopted, each of which pertains to aggressive work by the association. The work thus far referred to as accomplished, under its former and present regulations, constitutes only a small part of that which has been done by it for the advancement of the material interests of the profession.

Another association which we cannot forbear to mention is the National Association of Dental Faculties. This organization was brought into existence August 4, 1884, in New York City. Its object, as then declared, being the bringing about the adoption of a uniform standard of graduation. The following colleges were represented—viz.:

Baltimore College of Dental Surgery—R. B. Winder and M. W. Foster.

Boston Dental College—J. A. Follett and A. N. Blodgett.

Chicago College of Dental Surgery—A. W. Harlan and F. H. Gardiner.

Harvard University, Dental Department—Thos. Fillebrown.

Dental Department, State University of Iowa—A. O. Hunt.

New York College of Dentistry—Frank Abbott and J. B. Littig.

Dental College of the University of Michigan—J. Taft.

Ohio College of Dental Surgery—H. A. Smith.

Pennsylvania College of Dental Surgery—C. N. Peirce, and Henry Leffmann.

Philadelphia Dental College—J. E. Garretson, S. H. Guilford.

University of Pennsylvania, Dental Department—Jas. Truman, E. T. Darby.

Letters were also received from the Deans of the Kansas City Dental College and the University of California, Dental Department, endorsing the object of the meeting and pledging their support to the movement.

Article 2 of the Constitution, as adopted, declares that the object of this association shall be to promote the interest of dental education. The following resolution in regard to new members declares that any dental college which desires to join the association, between the annual meetings, may be enrolled upon sending its application to the Committee on Membership, accompanied by satisfactory evidence that it has complied with the rules and regulations of the association and paying assessments.

Dr. C. N. Peirce was chosen the first president. Up to this period most of the colleges in the country accepted five years' practice as the equivalent of a first course of lectures. Dr. James Truman moved that after the close of the session of 1884 and 1885 students at the dental colleges be required to attend two full regular courses of lectures before coming up for graduation. This was adopted.

"Resolved, That we recommend that three years' study of dentistry, including an attendance upon two regular courses of lectures, be required of students previous to coming forward for graduation from a dental college."

The volume of proceedings of this body from its inauguration to the present time is one of exceeding interest. It influences the profession in a manner very different from any organization that has been considered in this paper. Those, to which attention has been given, have reference to and were intended to influence those already in the practice of dentistry, and for their benefit mainly. The work of the National Association of Dental Faculties had for its prerogative, the proper training aud education of those proposing practicing dentistry as a life work, and giving little or no attention to those already in practice, so that its work was for the future, rather than for the present.

Steps of progress were made at every meeting of the association from its beginning to the present time. Prior to this organization no entrance requirements had been enforced by the large

majority of colleges then in operation. This requirement was one of the first movements by the body; it is a question that received more or less of attention at every meeting of the body. The curriculum has received earnest consideration at nearly every meeting. The length of course for graduation was, at the beginning of this body by nearly all the colleges, two years of four months each. This time has been lengthened to three years of seven months each for graduation, and this has been increased to four years, to go into effect October, 1903.

The requirements of this asociation have been rigorously enforced. Quite a number of cases of discipline, for violation of rules, have come before the body, and were always adjusted with reference to the best interests of the association, of the profession and the public.

Another society, viz., "The National School of Dental Technics" (now Dental Pedagogics) was organized in Chicago, 1893. This was declared to be a movement for systematic teaching of dental technics, suggested by Dr. G. V. Black. This was a movement in behalf of dental college work which was greatly needed. The suggestion was made, and for a time advocated, to establish this work as a department of the National Association of Dental Faculties. This, however, after due consideration, was regarded as impracticable, hence the estblishment of the School of Dental Technics. This work has been growing in importance and efficiency each year since its inauguration. Its membership now consists of representatives from twenty-two dental colleges, the number increasing each year. The work already accomplished by this body is prophetic of large things in the future, and doubtless, ere long, our colleges will all find it important and even necessary to take part in this work.

Another organization that has exercised a great influence for good to the profession, and the public as well, is that of the "National Association of the State Boards of Dental Examiners." This body is composed of representatives from the "State Boards of Dental Examiners," which have for their function the carrying out of the requirements of the different State laws regulating the practice of dentistry. This central body has done much in the way of unifying, and making more effective the work of the State boards. In this connection it seems necessary that some reference

be made to the influence exercised by State dental societies. The organization of the first State Dental Society was by Virginia, December 12, 1842. The Mississippi Valley Association, though not a State body, was organized August 8, 1844. The Pennsylvania Association of Dental Surgeons was organized December 14, 1845. The Society of Dental Surgeons of the State ot New York, November 17, 1845. The State societies of Pennsylvania and New York were not incorporated until 1868, and Virginia in 1890. The Ohio State Dental Association in 1866.

State and local organizations were from this period on established in rapid succession. Now almost every State in the Union has its dental society. In some respects there is no more important work in the profession than that of the State society. It exercises a healthy influence upon local societies. It is by the direct work and influence of State organizations that laws for the regulation of dental practice have been enacted, and in the main, executed. It is impossible to even proximately estimate the results of these State bodies. Our State societies, while looking to legal affairs, accomplish other work as well. They are and always have been the mainstay aud support of the American Dental Association. Some of the best scientific work done in our profession has been by some of the State societies. They also engage in clinical work, surgical, operative and prosthetic as well.—*The Dental Review.*

ANCHORING GOLD CONTOUR FILLINGS.

Shawano, Wis., June 21, 1902.

Editor American Dental Journal:

At your request to contribute in a literary way to your new dental journal I feel I ought to put forth an effort to grant the same to a colleague who is doing so much for the profession, while I have never before made an attempt at dentistry with a pen.

My subject is old, but my method may be unique to somebody in the profession.

ANCHORING GOLD CONTOUR FILLINGS.

The secure anchorage of gold contour fillings in incisors is a problem that confronts every dentist and no method can be

given to meet the requirements of every case, but each must be made a study before commencing the operation.

The conditions of this case were in the mouth of a young woman who was very desirous of having fillings instead of resorting to artificial crowns, and who, for six years, had kept her teeth filled with cement, which follows that the pulp had receded well from the cutting edges, which were *unusually thick*. The patient had an upper central with each corner badly decayed and the adjacent teeth decayed at contact, which condition enabled me to drill with a round burmesially and distally between the plates of enamel to make the cavities meet, it being done with less than ordinary pain and without injury to the pulp. The cervical portion of the cavities having been prepared in the ordinary way, a gold bar (made by soldering together strips of 22 karat gold scrap) was covered with cement and passed through the hole from one cavity to the other, and bent in a direction best to support the gold to be built down to it, thus anchoring each filling so that by means of the bar one filling is a retainer for the other. These fillings were inserted a year and a half ago and the tooth is in excellent condition to-day. The gold bar does not show through labial plate nor can it scarcely be seen through the lingual.

In teeth having live pulps this method would rarely do, but in this particular case it has proved a success in every respect. I have since used this method in pulpless teeth with great satisfaction, feeling assured that of seven different methods I employ in anchoring contour fillings the foregoing will stand the test in this case where others might fail.

Yours truly, H. J. CALKINS, D. D. S.

PREPARATION OF CAVITIES.

BY F. W. STEPHAN, CHICAGO, ILL.

(*Read Before Chicago College Dental Society, February, 1894.*)

The operation of filling a tooth seems at first one of the simplest things imaginable. One reasons to himself: "All that is necessary to do is to remove the decay thoroughly, chip away all overhanging enamel margins, bevel and smooth the edges,

shape the cavity to retain the filling, and insert the filling material; being careful to pack it thoroughly against the margins." This is the fundamental idea, but there are so many principles in connection with this, and of so great importance, that the skilled operator sees a pyramid of consideration resting upon this foundation.

I will try to present to you a few of the points which are of importance in determining the shape which cavities should possess in order to obtain the best results in operative dentistry.

In the first place, let us study the shape of the typical tooth and see what lesson it teaches us. We find every tooth in the denture is wider at the occluding surface than at the gum margin. This makes the occluding surface apparently one continuous mass, while there is quite a space existing between the teeth at the gum line. (See Fig. I.) You will also notice, if the gums be in a

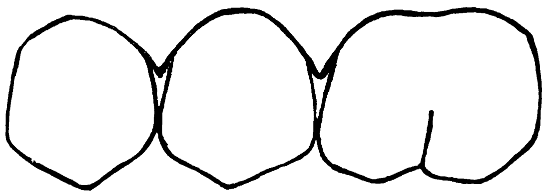

FIGURE I.

normal healthy condition, that they fill these interproximal spaces and are quite tough or gristle-like. These conditions prevent the lodgment of food between the teeth. First, the food crowding between the teeth must pass through a very narrow space into a

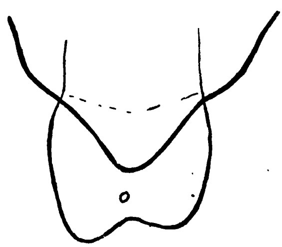

FIGURE II.

larger. Second, the gums rising into these spaces in a pyramidal form slide any substance sideways. (See Fig. II.) This arrangement is essential to the comfort of the patient in masticat-

ing, and also insures that the proximal surfaces will be kept clean.

The proper way, then, is to imitate nature and always build out a filling so as to obtain a good contour. Never file spaces between the teeth under the impression that they can be kept clean better.

Now let us see where decay is most liable to occur. It is almost always where there is a chance for lodgment and retention of some foreign substance. This is usually in pits, fissures or around the point of contact on the proximal surfaces. It is seldom that a tooth will decay on a smooth labial, lingual or buccal surface. These facts are of the utmost importance. We wish to make our fillings last forever—that is, as long as the patient lasts—if possible. In some cases at least, we are able to

FIGURE III.

say with tolerable certainty the filling will last the patient's lifetime.

We will now consider two classes of cavities—the crown or occluding surface cavity and the proximal cavity.

We will choose an occluding surface cavity in an upper first molar. It will invariably have started in a pit or fissure. The opening at first is small, but after cutting through the enamel, decay is found to be somewhat extensive. We remove the over-

FIGURE IV.

hanging walls of enamel and have a condition like this. (See Fig. III.) If the cavity is filled as it is we leave a crevice in the

enamel running directly to the edge of the filling. There is a chance for the leptothrix buccalis to build its nest. That fissure should not be left. It takes a very little more trouble to cut that fissure out and fill it, and if the filling is perfect it ought to last a lifetime. (See Fig. IV.)

Next we will consider proximal cavities. Decay will usually start around the point of contact. If we prepare our cavity so that the margin will be at or near the point of contact, the same conditions which made that tooth decay at first are sure to act upon the enamel margin of our filling. Consequently the filling would be almost certain to fail. This makes it necessary sometimes to remove considerable good, sound tooth structure in order to prevent recurrence of decay.

Assuming that the cavity is properly shaped, the next step is to give it a retentive form. This must be done with a view to keeping the walls as strong as is possible and attain the object desired. The means of retention are by pits and grooves. Pits

FIGURE V.

should hardly ever be used, except where our ability, or rather inability, makes it necessary in order to get the filling started without rocking. Grooves are the best form of retention. They allow the entire extent of the cavity walls to assist in retaining the filling. Thus they need not be so deep as pits and therefore would not endanger the pulp as much.

The occluding surface cavities are the simplest to prepare. They merely require a groove around the floor. (See Fig. V.)

FIGURE VI.

Or a groove on one side only, the other being parallel, will sometimes do. This because the filling to tip out at (a) must form an

arc on the center (b) which would be prevented by the wall (c). (See Fig. VI.)

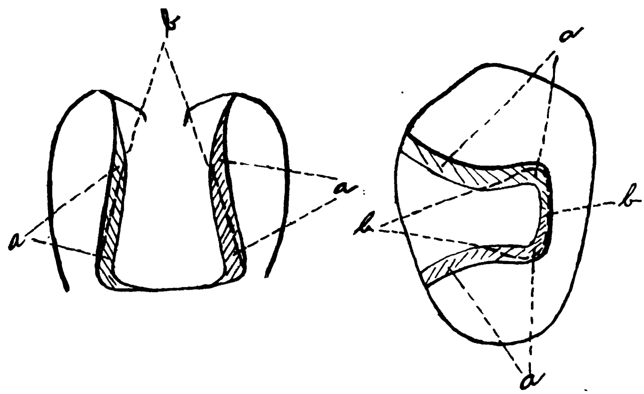

FIGURE VII.

Proximal cavities in bicuspids and molars should be prepared in this way. (See Fig. VII.) (a) Bevel of margin; (b) undercut.

Proximal cavities in the anterior teeth involving the cutting edge should be prepared in this manner. (See Fig. VIII.) To tip this out the point (b) must turn on the center (a). This point (b) would aid in the retention of the fillings as well as

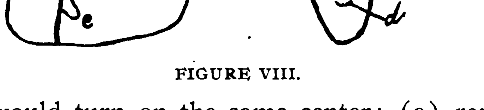

FIGURE VIII.

(c), which would turn on the same center; (a) represents line of undercut. This preparation takes advantage of every point of strength possible to retain these difficult fillings, and allows a very strong operation.*

In conclusion I wish to thank my hearers for their kind attention and trust this paper may bring out a valuable discussion.

*At the time of writing this paper the essayist had not used the step cavity preparation advocated by Drs. Black and Johnson.

Editorial....

THE ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

Within the last year many things of interest in connection with the Illinois State Board of Dental Examiners and the so-called diploma mills have taken place. The present Board have been enabled to carry on their work more satisfactorily, through financial assistance of the National Association of Dental Faculties, the Illinois State Dental Society and the National Dental Association. One reform after another has been made by this Board until things are getting in passable shape.

One of the most notable reforms was accomplished when, upon the advice of the Attorney General of the state, the Board passed a new set of rules governing the requirements of reputable Dental Colleges in order to receive recognition of the diplomas of their graduates and the requirements of candidates presenting themselves for examination for a license to practice in the state. (We print these rules in full in this issue.) The graduates of the colleges, which in the judgment of the state Board had failed to meet these requirements as laid down in these rules, were denied a certificate upon their diploma. One of the colleges to fall under this ban was the German-American Dental College of Chicago. A graduate of this institution presented his diploma as credentials for the issuing of a certificate to practice in Illinois, whereupon he was refused—through the Dean of the German-American Dental College, Fritz W. Huxmann, a mandamus suit was brought against the Board to compel them to recognize his institution as one living up to the requirements as laid down by the Board, and to issue certificates to graduates of his school upon their diplomas. The case was started before Judge Chetlain, one

of the judges of the Superior court, on July 9th, continuing for ten days.

Judge Chetlain took the case under advisement, with the promise of rendering a decision by August 1st. As to the outcome —to those who heard much of the testimony, there can be but one verdict. This is surely the beginning of the end—let the good work go on, and let no stone go unturned until the odium which has hung over the Dental Profession in Illinois shall have been removed.

Too much cannot be said in commendation of the faithful services rendered by the present Board; their labors have been unceasing and untiring—they have neglected private business to serve the profession they love. During the ten days of the trial they could always be found present, while the members of the profession who should be interested were most always found absent.

J. H. Worman, United States Consul General at Munich, Germany, stated publicly that, had it not been for the faithful services rendered by a member of the Board at that time, and who was the only man to be reappointed, he never would have been able to do what has been done by him in bringing the evil-doers to justice.

RULES AND REGULATIONS.

Adopted by the Illinois State Board of Dental Examiners.

COLLEGES.

Every college in this state shall be required to publish as their Preliminary Educational Requirements those laid down by this Board, and we suggest that each college conformning to these Rules shall specifically so state and publish in its Annual Announcement.

RULE I. The following preliminary examination of students shall be required:

Evidence of a good English education, to be shown by a diploma of a recognized literary or scientific institution, high or

normal school, or in the absence of these, a satisfactory examination in all the branches of a good English education under the supervision of the Superintendent of Public Instruction, who shall also decide upon the validity and value of all credentials. His decision shall be final, subject to the approval of the State Board. All certificates or educational qualifications before being accepted shall be verified by correspondence with the authority issuing said certificate. In addition thereto, there shall be required of each student a certificate of good moral character.

RULE II. Full course of didactic lectures and instructions must be given of not less than three terms of seven months each, covering a period of three years, and a succeeding term shall not begin until twelve months have intervened between the beginning of the last preceding term and the beginning of a succeeding term. After and beginning in the year 1903, four terms of not less than seven months each and covering a period of four years, and a succeeding term shall not begin until twelve months have intervened between the beginning of the last preceding term and the beginning of the succeeding term, embracing the following subjects, viz.: Anatomy, Physiology, Histology, Chemistry, Metallurgy, General and Special Pathology, Hygiene, Materia Medica, Therapeutics, Bacteriology, Oral Surgery, Operative Technics, Prosthetic Technics, Operative and Clinical Dentistry, Prosthetic Dentistry and Orthodontia.

Quizzes must be held at least once in each week in each branch.

Attendance upon the entire course as named above will be required; deductions of not exceeding 20 per cent. to be allowed for unavoidable absence. This may be extended 20 per cent. in cases of bona fide illness attested by a physician, provided all studies are fully made up.

RULE III. The college must have suitable and proper facilities and equipment as regards lectures, chemical, histological and bacteriological laboratory, dissecting room, operating rooms, and prosthetic laboratory, and must provide and furnish in them thorough and systematic instruction to its students, and the infirmary in all its interests must be conducted along strictly ethical lines.

RULE IV. Each Dental College must have a teaching faculty of at least six persons, licensed practitioners of Dentistry in good standing with the Dental profession, and teaching the *subjects* named in these rules. Provided that the basic subjects of medical and dental education, as Anatomy, Physiology, Chemistry, and Comparative Anatomy, etc., may be taught by experts in those subjects not dentists. Salaries must be adequate to secure and assure proper and efficient instruction and service.

RULE V. No college shall permit any member of its faculty or teaching staff, Board of Trustees, or Stockholders to serve as a member of the State Board of Dental Examiners.

RULE VI. No college shall give credit for a full course to students admitted later than ten days after the opening day of the session, as published in the announcement.

RULE VII. In case a student is prevented by sickness, properly certified to by a reputable practicing physician, from complying with the foregoing rule, the time of admission shall not be later than twenty days from the opening day.

RULE VIII. In cases where a regular matriculated student on account of illness, financial condition or other sufficient causes, abandons his studies for a time, he may re-enter his college at the same or subsequent session, or where, under similar circumstances he may desire to enter another college, then with the consent of both colleges he may be transferred, but must make up the time lost.

RULE IX. Students in attendance at colleges, to obtain credit for a full term, must be and remain in attendance throughout the term and until the close of the session.

RULE X. Colleges may receive into the advanced grades of Juniors and Seniors only such students as hold certificates of having pased examinations in the studies of the Freshman or Junior grades respectively. All students who have successfully passed their examinations for advanced standing shall have their certificates given or mailed to them within thirty days after such session shall have been completed. Such certificates to be pledges to any college recognized by this Board to whom the holders may

apply, that the requisite number of terms have been spent in the institution by which the certificates were issued and giving the list of subjects passed.

INTERMEDIATE CERTIFICATE.

Place ....

This certifies that..............................has been a member of the..............................Class in the ....during the term of................

He was examined at the close of the term in the required studies, as stated herein, and is............................ entitled to enter the.............................class.

Freshman Year. Junior Year.

(List of Studies.) (List of studies.)

RULE XI. This certificate shall, by correspondence, be verified by the college by which it was issued. Without such certificate no student shall be received by any college recognized by this Board for admission to the advanced grade, except on such conditions as would have been imposed in the original school, and these to be ascertained by conference or correspondence with the school whence he came.

STANDING OF STUDENTS HOLDING CERTIFICATES FROM DENTAL COLLEGES IN FOREIGN COUNTRIES.

RULE XII. In case of persons holding certificates from colleges of dentistry in foreign countries, they shall be required to furnish properly attested evidence of study, attendance upon lectures, examinations passed satisfactorily, etc., the same as required of students coming from our own institutions.

And in case of students coming from foreign countries and speaking the English language they shall be given credit for the time passed in any foreign college recognized by this Board. No student coming from Europe shall be received by any college until his credentials shall have been approved by the proper authorities of the country from which he claims to come.

ADVANCE STANDING AND ADMISSION OF GRADUATES OF MEDICINE.

RULE XIII. Advance standing in the classes shall not be given students except in the following instances:

First. Where a student shall have taken a full course in a school recognized by this Board and shall have successfully passed the required examination.

Second. When a student shall present evidence of graduation from a reputable medical college he may receive one year's advance standing.

RULE XIV. Examination conducted by colleges shall be in the English language only.

RULE XV. Any student who is suspended or expelled for cause from any college shall not be received by any other college during that current session. In case the action of the first college is expulsion, the student shall not be given credit at any time for the course from which he was expelled. Any college suspending or expelling any student shall at once notify all other colleges of its action. (Students are required to obey the laws regulating the practice of dentistry in this state, and failing to do this, shall not again be received into any college in this state.)

RULE XVI. Colleges shall each year issue announcements containing lists of students classified in the three grades of Seniors, Juniors and Freshmen, designating absentees, irregulars and specials, and giving a list of graduates of the preceding sessions.

RULE XVII. No college shall confer any degree as honorary which is usually granted in due course of study and examination.

RULE XVIII. No credits for time spent or studies pursued in any dental college not recognized by this Board shall be allowed by any dental school in this state.

RULE XIX. There shall be graded courses of instruction, each course to be followed by examination thereon.

RULE XX. Candidates for graduation must have attended three regular courses of lectures as above stated, and must pass

satisfactory examinations in the studies above named in these rules and any additional studies named in their schedule. They must also furnish creditable evidence of having spent not less than three calendar years in the study of dental surgery, or medicine and surgery and dental surgery (in which last case not less than two full calendar years must have been spent in study of dental surgery proper), and all of the studies must have been under the direction of competent preceptors. This rule applies to those only who matriculate prior to the fall of 1903. Schools will not be allowed to graduate students who have failed in more than one study of the regular course or who at the time of graduation have not succeeded in completing 75 per cent. of the required clinical operative and prosthetic work.

RULE XXI. A graduate of a recognized dental college, who applies to another college for the degree of Doctor of Dental Surgery or Doctor of Dental Medicine, shall complete one full course or more of instruction in said college and comply with the requirements of the Senior Class or its equivalent.

RULE XXII. The President of this Board may appoint a committee or committees to investigate any innuendos or charges against a recognized college, or any other matter that may in any way come to his knowledge which in his opinion may require investigation in order that such statements or matters shall be proven true or false.

RULE XXIII. The practice of bestowing scholarships is no longer called for and is detrimental to the best interests of the professions, and hereafter no college recognized by this Board shall grant either free or beneficiary scholarships not absolutely made obligatory in their charter, and this rule shall include scholarships and credits for tuition issued in payment for advertising or any other purposes.

RULE XXIV. Colleges will be recognized or recommended only when there has been actually secured by purchase or lease and fitted up with all required equipments, a sufficiently commodious and convenient building, entirely adequate to the needs of a reputable dental college. Such equipment shall include not

only the laboratories, infirmaries, etc., with proper chairs, benches, and all other apparatus required for complete practical dental instruction, but also the rooms and fittings necessary for scientific training, with apparatus and equipments necessary for the proper teaching of Bacteriology, Histology, Microscopy, Chemistry, and such other scientific studies as should form a part of an advanced dental curriculum of study, and as are required by these rules. And only when the character and attainments of its faculty, which must already have been named, and a list of the members of which with the respective positions they are to occupy, shall be clearly set forth, are such as to give assurance that the school will be conducted in a manner to reflect credit upon the dental profession and to insure complete and adequate instruction in all branches of a broad dental curriculum of study.

RULE XXV. Full credit shall not be given by colleges recognized by this Board for courses of instruction which do not commence in the morning and continue through the day.

RULE XXVI. Beginning with the session of 1902-1903, the date for the opening of the regular session of schools recognized by this Board shall not be later than the first Saturday after the first Tuesday in October of each year.

RULE XXVII. The lists of students as published in the catalogue shall include only those who have been in actual attendance for at least three months, all students not in full attendance to be classed as irregular. In the publication of names of students in the annual announcement of colleges recognized by this Board, those students who have been transferred during the session shall be indicated. All certificates of educational qualification of such students before being accepted shall be verified by correspondence with the authority issuing said certificate.

RULE XXVIII. A receipt for all tuition fees issued to a student by a college recognized by this Board, shall constitute for the student a release of all financial obligations to said college, and the fees for the session shall be only as published in the annual announcement of the college issuing the receipt.

RULE XXIX. The time for acceptance for first courses in lieu of the Junior year under the old two-year course of study shall close with the session of 1901-1902.

RULE XXX. The giving of certificates of recommendation for vendible articles by teachers in dental colleges, to be printed or published as advertisements in journals or circulars is a professional offense to be classed with the issuing of the same kind of advertisements for personal purposes.

RULE XXXI. The minimum tuition fee of colleges recognized by this Board, shall be one hundred dollars per term, beginning with the session of 1902-1903.

RULE XXXII. A careful arrangement of the curriculum is recommended, to the end that all the important parts of each branch of study may be covered without omission, confusion or repetition, so that the student's time may be utilized to the best advantage. Proper records should be kept of the attendance, markings and standing of each student; also of all examinations.

RULE XXXIII. The Secretary is not authorized to issue the license of the Board upon diplomas of colleges not previously recognized.

Any such colleges in order to obtain recognition, must through their officers make application to the Board, accompanying it with authenticated copies of the announcements, schedules of lectures, quiz and examination questions, or so much of them as the Board may require, to form an intelligent judgment; and there should also be furnished a statement of the equipment and facilities of the institution, and its legal status in other states, particularly its home state, if not located in Illinois.

RULE XXXIV. Although a college may have been recognized by the Board as reputable, yet the Board reserves the right to withdraw such recognition at any time, when it may deem it for the best interests of the public to do so. The failure of any college to live up to its profession and published announcements may involve such withdrawal of recognition. The President and Secretary of the Board are instructed to suspend such recognition, pending an investigation, when any charges or facts come under

their cognizance affecting the standing of such college. In addition to the minimum requirements of the Board, colleges will be held to a strict compliance with all their own published requirements, and to the observance of all rules which they profess and any material deviation therefrom coming to the knowledge of the Board will be held sufficient grounds for suspension of recognition, as above stated.

RULE XXXV. No college shall be or continue to be recognized by this Board, if said college is managed or conducted in whole or in part by any person or persons who do not practice dentistry in accordance with well recognized and general accepted forms, usually known as dental ethics, or if owned in whole or in part by men or women who are engaged in disreputable dental practice, or having upon its list of trustees, in its faculties, among its demonstrators, or in any capacity, anyone who does not practice dentistry in accordance with principles above mentioned. And no colleges shall be or continue to be recognized by this board which by itself or any number of its faculty or by any of its officers, trustees, directors or agents shall be found guilty of the sale of a diploma or diplomas or any degree or certificate of merit in scholarship or standing, or which shall be found guilty of having done or practiced by itself or by any member of its faculty or by any of its officers, trustees, directors or agents any unethical advertising or solicitation for business, and upon all such questions the judgment and conclusion of the Board of Examiners, as upon all other questions arising under these rules, shall be absolute, final and conclusive to all parties concerned.

EXAMINATIONS AND LICENSES.

RULE XXXVI. Any and all such persons as were practitioners of dentistry in the State of Illinois at the time of the adoption of the act entitled, "An Act to insure the better education of Practitioners of Dental Surgery and to regulate the practice of Dentistry in the State of Illinois," approved May 30, 1881, and in force July 1, 1881, and any and all such persons who have received a diploma from the faculty of some reputable Dental

College, and any and all persons removing into this state who shall have practiced Dentistry for a period of ten years in conformity with the laws of the state from whence they came, anl any and all persons holding the diploma of Doctor of Medicine from any reputable Medical College, may come before the Board at any of its regular meetings for examination in the several branches of dentistry, and if found proficient, the Board will issue to the said candidate a license to practice. An average of at least 80 per cent. in all branches will be required. If any applicant falls below 50 per cent. in any one branch, he shall fail to pass, but may take the examination again at any regular meeting and shall be re-examined in full upon all branches that other applicants are examined in at the examination. Every candidate should notify the Secretary of the Board of his intention to be examined one week before the examination takes place.

RULE XXXVII. No license will be issued to any candidate except after examination by the Board at a regular meeting, except when issued upon a diploma granted by the faculty of a reputable Dental College.

MISCELLANEOUS RULES.

RULE XXXVIII. There shall be two regular meetings of the Board held each year, the time and place to be determined by the members of the Board. Special meetings may be called at any time by three or more members of the Board for the transaction of such busines as may come up before it, with the exception of the examination of applicants for license.

Due notice of all meetings shall be given by publication in at least one dental journal published in this state, and by the Secretary of said Board, mailing a notice to each person, who may notify him of his or her desire to attend any meeting of said Board.

RULE XXXIX. Examinations shall be practical, oral, or in writing, or partly oral, or partly written, as the Board may determine, and shall be held in the English language.

RULE XL. Said Board may employ an agent or agents, whose duty it shall be to report to the Board or its attorney, the names of all persons, whom he believes to be practicing dentistry unlawfully. His compensation shall be fixed by the Board.

Rule XLI. Said Board shall not contract any debts beyond the amount of money they have on hand to pay.

Rule XLII. Any dentist desiring to practice dentistry in any county must record his license with the county clerk of said county before he begins to practice.

Rule XLIII. No person, firm, company or dental parlors shall commence to practice or solicit dental work unless the names of all persons composing such person, firm, company or dental parlors appear on their signs, cards, or advertisements, and all of said persons must be registered dentists.

Rule XLIV. No person except a registered dentist shall hold himself or herself out to the public as a dentist for the purpose of securing patients, although the work may be performed by registered dentists. The law makes no provision for the assistant dentists, and an unregistered dentist with a separate chair cannot work under a registered dentist. But this shall not be construed to prohibit the instruction of bona fide students in the office of the practitioner or in the schools of this state, but no student can legally operate unattended or in the absence of his preceptor or instructor.

Rule XLV. Any person who holds himself or herself out to the public as a dentist in any manner by card, sign, advertisement or office, shall be deemed to have commenced the practice of dentistry.

Rule XLVI. All rules in conflict with the foregoing are hereby repealed.

OFFICE RIGHTS.

A great deal has been said and written of late upon the subject of Office Rights—many practitioners have been victimized in various ways by men purporting to sell office rights on goods which are free to the use of any who may buy them.

There is a vast difference, however, between the matter of selling office rights and a man having a scheme of his own for doing certain kinds of work, and the average practitioner not being able to handle this system successfully without receiving instructions from the inventor of the system, and the inventor making a fixed charge for time spent in teaching the practitioner how to do the work successfully by his system or method.

A good example of this is the Carmichael system of Bridge Work—which is a system of making attachments for bridges without the necessity of destroying the pulps of the teeth, and still the teeth be practically as safe from death of the pulp under this form of attachment as they would under the natural tooth. Dr. Carmichael claims, and rightly so, that his system cannot be successfully practiced without instructions from himself or some one else competent to use the system; for this instruction, he makes a charge, and not for the office right of the same.

Some of our best practitioners used this system successfully years before it was patented, so that it is not absolutely new. Many of our practitioners have availed themselves of the instruction offered by Dr. Carmichael and report excellent results.

.. ITEMS ..

PROPHYLACTIC ITEMS.

BY R. B. TULLER.

Begin at the beginning.

The beginning is with children.

The younger the better—if they have any teeth.

How to cook a hare. First catch your hare.

How to treat a child. First catch your "kid."

Excuse the slang—first catch the precious little lamb.

If you have one of your own begin on him.

Ten to one your mother-in-law knows more than you do.

Her mother told her how, and her mother told her.

A dentist is a prophet without honor in his own household—often.

Not exactly *dis*honorable, but what does he know about children's teeth?

Try your knowledge and skill on somebody else's children.

About one mother in 7,000 will bring her baby to the dentist.

Isn't that so?

So they are not so easy to catch—not even your own.

If you should be called on be prepared.

Tell the young mother that baby teeth need cleaning.

Not with a brush at first—use a soft piece of linen.

The brush comes later; a soft one; a small one.

A small brush can get around in anyone's mouth where a large one can't. Always better.

Children properly taught will never forsake the tooth brush.

We have to educate the pa and ma first, in many instances.

Some you can hypnotize and some you cannot.

If you get them hypnotized, educate them along the whole line of prophylactics.

It will do them good and you won't get so many teeth to fill.

Can't help that, we're here to do our best for suffering humanity.

But don't be alarmed, they will take your advice and won't follow it.

Then you get them later, but you've done your duty.

You'll tell the young wife to bring that child in and have its baby teeth examined.

You'll say "baby teeth" instead of deciduous, because she'll understand better.

She'll think you are working up "trade," but you have done your duty.

Some day she'll come in with a howling youngster with the howling toothache.

Pa and ma didn't sleep and the child's trouble was up to them.

And they were up to the child's trouble, and up with it.

Hot camphor and toothache drops failed to work.

Then they think of the dentist.

Please drop everything else and relieve this child.

First get him under control—if you can.

Then clean out the cavity—if you can.

And fill it so it never, never will give any more trouble—if you can.

The next child will be brought around earlier in life—maybe.

He may be too young to sit in your chair by himself.

He'll sit in mother's lap, however, and let the dentist look at his "toofins."

You make goo goo eyes—at the child, not the mother.

You find, perhaps, some little pin hole pits.

Ten revolutions of the engine point—or twenty, removes all decay.

Amalgam, tin, cement or gutta percha will quickly fill them.

There are other spots of decay, not deep pits, but superficial patches, possibly shallow pits.

If you can get them absolutely clean and dry (use chloroform on cotton, to clean) rub heated parafine into them.

Use a tape saturated with it or pellet of cotton. Heat over flame, but avoid catching fire.

Other places may be treated with nitrate of silver.

It will make every atom of decay black as a coal.

It will, however, check decay and keep immune for some time.

You must judge of advisability of this treatment with its intense blackness.

It will check decay and head off trouble for little ones when nothing else can be done.

Use a silver wire. Put a drop of nitric acid on mixing slab. Touch end of wire to it and then to spot, or cavity, of decay, first drying.

Wipe off surplus, if any. Don't let wire come in contact with anything you don't want stained.

It don't get immediately black, but will sure enough.

Does such black look worse than dark, brown decay?

Or black cement or amalgam often used in children's teeth?

A wise dentist will decide wisely what is best to do in each particular case.

He should *know how,* so if he can't do one thing he can do another.

Look at next month's items.

If you can add anything practical to our items, send it along.

HIT AND MISS.

A sure sign is one that reads, "No trust."

If a man has a good memory he knows when to forget.

Be sure you're right, then be sure you're sure.

Much of the milk of human kindness tastes of the pump.

Flattery is always dished out to other people—never to us.

Some of the so-called baseball diamonds are rank imitations.

It is said that co-education transforms colleges into match factories.

The meek will of necessity have to inherit the earth if they ever get it.

When it comes to cutting remarks the tongue has the sword beat a block.

Before some preachers condemn sin they investigate its financial standing.

A man must have self-confidence to enable him to ignore his own mistakes.

A man is seldom a cynic unless he has something wrong with his digestive apparatus.

Some men make fortunes out of old things, and others starve while trying to invent new ones.

Taxidermists are not collectors of taxes and are usually honest even though they do work a skin game.

When a man is at the oars in a rowboat he is always backward in coming forward.

A Chicago man went into his cellar to cool off, but the gas meter staring him in the face made him hotter than ever.

A PROPHECY FULFILLED.

" 'Wars en rumors er wars,' " said the old deacon, " 'en airthquakes in divers places!' Dat's what de Bible says gwine ter be des fo' de worl' comes ter a end, en I sees by de papers de divers is done got places under the guv-ment, an' day furfills de prophecy. I shouldn't wonder any, right now, w'en you's a-sleepin' en dreamin' dat de house rent's paid, en de water bill settled, ter heah Gabriel blow his ho'n en say: 'Put on you' close en come to jedgment—you mis'bul sinners, you!' Shouldn't be 'tall surprise ter see de sun shut he eye, en de moon paintin' de sky red. En dat remin's me; w'le things is lookin' so skeery I ain't gwine ter pay no mo' rent in advance—I don't keer ef de lan'lord takes down de steps en nails up de winders! Kase de Bible comin' true en hit may be jedgment fo' de lan'lord sign de receipt. Look out, sinners—look out!"—*Atlanta Constitution.*

The following is from the Toledo *Evening News* of July 16th, and refers to the son of Dr. C. W. Munson of that place.

EARL F. MUNSON, OF TOLEDO, SANK TO DEATH IN CLARKE'S LAKE.

Exhausted While Swimming Across the Lake—Son of Well-Known Dealer in Dental Supplies.

A special dispatch to *The News* from Jackson, Mich., last night says:

"This afternoon at half past five o'clock Earl Munson, of Toledo, a young man about 20 years old, was drowned at Clarke's Lake, a resort 12 miles south of Jackson. Munson was one of a party of young people from Toledo, who came to Clarke's Lake for an outing, and when the others went home he concluded to stay. This afternoon, the young man, in company with Arthur Green, of this city, started to swim across the lake, pushing a canoe ahead of them. When about half way across they allowed the canoe to drift too far away. The canoe was carried by the breeze down the lake and Munson became exhausted and sank. The body was recovered an hour later about one hundred feet from the steamboat landing at Beache's hotel. Green was rescued."

The unfortunate young man was the son of C. W. Munson, the well-known dealer in dental supplies, whose residence is at 724 Oakwood avenue. A telegram to Phillip Schilling, who had been one of the campers, informing him of the drowning, was given into the hands of Owen W. Munson, an older and only brother of Earl, and he conveyed the sad news to his mother at about midnight last night. As a result Mrs. Munson was prostrated by the terrible news. Her husband is in Philadelphia on a business mission, but a telegram was sent him last night.

Owen Munson left for Clarke's Lake this morning to look after the return of his brother's body to this city.

The deceased was a most worthy young man and well liked by a host of acquaintances. He was 20 years old last May, was born in Toledo and educated in the Toledo schools. He went to Clarke's Lake with a camping party, and when they returned on

Friday, was persuaded by other friends to remain over a few days.

Earl Munson was engaged to be married to Miss Blanche VanArsdale, daughter of A. N. VanArsdale, in the city clerk's office. The date of marriage had not been fixed.

PRESSURE ANAESTHESIA.

BY R. B. TULLER, D. D. S., CHICAGO.

Pressure anæsthesia for the painless removal of exposed living pulps of teeth is a practice successfully followed in the past several years by quite a number of dentists in different parts of the country. How general the practice is I am unable to say; but the method is not used to the extent it is worthy of I am sure. In a contact with a large number I find many who know little or nothing about it; or, who having tried it failed and gave it up.

I believe I am safe in asserting that there are few cases of pulp exposure that will not yield promptly to the treatment when the proper drug is properly applied. There are reports of cases where it would seem that there was some condition of the pulp that resisted any anææsthetic and hence proved failures, but judging from my own experience I am inclined to think that there was some fault in the medicament or in the application. While there are a number of things used, all claiming success, I believe we have nothing better than an aqueous solution of cocaine. I have heard of *aqua pura* being successfully used, but the efficiency of it would seem to me doubtful. If numbness is caused by the forced infiltrations of fluid, whether water or something else, an aqueous solution of cocaine would make anæsthesia doubly certain, for aside from what pressure of itself may do we get the specific action of the drug.

But our medicament, whatever it may be, goes for naught unless we can get force applied so it goes directly onto and into the plug of soft vulcanite rubber pressed in with a suitable instrument. formed, or with walls all around, the problem of pressure is an easy one after decay and debris has been removed. A pellet of cotton saturated with the fluid is inserted and followed with a plug of soft vulcanite rubber pressed in with an instrument.

But the larger number of exposures are in the cavities with one wall gone, if not more. To confine our fluid here so as to

press it into the pulp requires the building up of the walls with cement, modeling compound or something so that there will be no leak or breaking down under the pressure we must use increasingly for several minutes. With cocaine preparations we want no leaking out on the gums, or other parts. No toxic danger comes, however, from application to a tooth pulp.

It is teeth with walls gone that is accountable for most failures, I'm sure, since it seems to be, and is difficult to confine our fluid in such cavities.

Laboring under these difficulties and having had failures of my own on account of them, I cast about for some means to perform the operation with more exactness and certainty and with greater facility. I devised an instrument which, in my hands and in the hands of others, has not yet a failure to record.

In favorable instances (single rooted teeth), I have several times taken pulps out absolutely painlessly in less than six minutes from time of starting pressure. The device is simply a little cone of soft vulcanized rubber pushed on to the end of a small instrument having a shoulder against which the base of the cone abuts. The small point penetrates the cone half way. The other half is hollowed out into a little cup. Into this a little pellet of cotton is inserted and satured with the anæsthetic. It is then placed directly over the exposure and pressure applied, gently, very gently, at first, increasing steadily for about four or five minutes, when a suitable broach can be pressed to the very apex and the pulp removed with no pain. In some instances a little longer time may be required.

Pressure on the rubber cone forces the edges of the little cup close around the exposure and the point passing through the center forces the liquid out of the cotton into the pulp. If the cavity of decay is not shaped right or is too small to admit cone, it must be cut away, but not enough to despoil any good structure.

As suitable cones cannot be easily made by every operator, even if he can fashion the steel, the instrument complete will be made and placed on sale. Two points are needed, one practically straight, the other bent so as to get into distal cavities of molars.

With this instrument you are ready at a moment's notice to perform pressure anæsthesia. A minute quantity of medicine goes a great ways when it is made to go exactly where wanted.

A further use for the instrument may be found often in forcing some medicament into the roots of pulpless teeth.

TEN THOUSAND DOLLARS FOR EACH TOOTH.

Russian Opera Singer Gets $50,000 Damages in Railroad Accident.

Vienna.—Mlle. Sarkisova, a Russian opera singer, was traveling some time ago on the Transcaucasian railway when the train ran off the line and five of her teeth were knocked out.

Mlle. Sarkisova brought an action against the railway company, claiming that as the loss of five front teeth prevented her from singing she was entitled to heavy damages. The Civil Court in St. Petersburg has just awarded her $50,000 compensation.—*From the European Edition in the Herald.*

NEW COMMITTEES NATIONAL BOARD OF DENTAL EXAMINERS.

Niagara Falls, July 28, 1902.

Officers

President, Charles A. Meeker	Newark, N. J.
Vice Pres. from the West, Burton Lee Thorpe	St. Louis, Mo.
Vice Pres. from the East, J. A. Libby	Pittsburg, Pa.
Vice Pres. from the South, J. A. Hall	Collinsville, Ala.
Secretary, Joseph P. Root	Kansas City, Kas.

Committee on Colleges

C. C. Chittenden	Madison, Wis.
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H. J. Burkhart	Batavia, N. Y.

Committee on Conference

G. E. Mitchell	Haverill, Mass.
J. G. Reid	Chicago, Ill.
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William Jarvie	Brooklyn, N. Y.
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COMMITTEE FOR PROMOTING RELATIONS WITH FOREIGN EXAMINERS

William Carr	New York City
G. W. Pelzer	Great Falls, Montana
H. W. Campbell	Suffolk, Va.
R. H. Jones	Winston, N. C.

COMMITTEE ON CONTRACTS AND ACCOMODATIONS

J. Allen Osmun	Newark, N. J.

RECENT PATENTS OF INTEREST TO DENTISTS.

701,893. Top of tooth powder bottles, or cans, or other containers; Henry N. Kent, New Brunswick, N. J.

702,111. Artificial tooth crown; Joseph C. Osborne, Lawndale, N. C.

703,720. Extension crown for retaining partial lower plate, July 1st, 1902; J. Ellwood Dunn, Chicago.

Notices of Meetings

FIRST DISTRICT DENTAL SOCIETY OF ILLINOIS.

The twentieth annual meeting of The First District Dental Society, of Illinois, will be held at Rock Island, Ill., Sept. 23 and 24, 1902. Railroad rates are being secured, and an interesting program is in progress.

Avon, Ill. CLAUDE B. WARNER, Secretary.

VIRGINIA STATE DENTAL ASSOCIATION.

The Virginia State Dental Association will meet at the Hygeia Hotel, Old Point Comfort, Va., August 5, 6 and 7, 1902.

Visiting dentists will receive cordial welcome.

J. HALL MOORE, Cor. Sec.

THE G. V. BLACK DENTAL CLUB.

At the annual meeting of the G. V. Black Dental Club of St. Paul, held at Austin, Minn., June 20, 1902, the following officers were elected for the ensuing year: President, Dr. S. Bond, Anoka, Minn.; vice president, Dr. J. M. Walls, St. Paul, Minn.; secretary

and treasurer, Dr. Robert B. Wilson, St. Paul, Minn.. Board of Censors: Dr. A. C. Searl, Owatonna; Dr. G. F. Andrews, St. Paul; Dr. A. M. Lewis Austin.

HARVARD DENTAL ALUMNI ASSOCIATION.

At the thirty-first annual meeting of this asociation held June 23, 1902, the followng named officers were elected for the ensuing year: President, Luther D. Shepard, '79, Boston, Mass.; vice president, Charles E. Perkins, '90, Brocton, Mass.; secretary, Waldo E. Boardman, '86, Boston, Mass.; treasurer, E. Proctor Holmes, '88, Boston, Mass. Executive Committee: Waldo E. Boardman, chairman ex-officio, Boston, Mass.; William P. Cooke, '81, Boston, Mas.; Ned A. Stanley, '84, New Bedford, Mass. The council is composed of the above named officers.

WALTER E. BOARDMAN, Sec'y.

THE COLORADO STATE DENTAL ASSOCIATION.

At the sixteenth annual meeting of the Colorado State Dental Association, held in the Alta Vista Hotel, Colorado Springs, June 17-18-19, the following officers were elected for the ensuing year: President, H. B. Hayden, Colorado Springs; vice president, E. W. Warley, Pueblo; secretary, W. A. Brierley, Denver; treasurer, Wm. Smedley, Denver. The candidates elected for appointment by the governor on the State Board of Dental Examiners were: W. H. Hall, Denver; H. F. Hoffman, Denver; M. H. Smith, Denver; Theodore Ashley, Cannon City; Geo. R. Warner, Grand Junction.

The next meeting will be held in Pueblo, June 16, 17 and 18, 1903.

W. A. BRIERLEY, Sec'y.
70 Barth Block, Denver, Col.

NORTHERN INDIANA DENTAL SOCIETY.

The Northern Indiana Dental Society will hold its annual convention at South Bend, Indiana, September 24th and 25th. A good programme will be provided and a large attendance is anticipated. All are invited to come, also to participate in the meeting.

M. A. PAYNE, D. D. S., Sec.

Original Contributions

BACTERIOLOGY AND PATHOLOGY.

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BY GEO. W. COOK, B. S., D. D. S., CHICAGO, ILL.

[CONTINUED]

In the discussion of this subject thus far we have seen that bacteria play a great part in the arts. Facts have gradually accumulated from observation, patient work, and powerful concentration, which have resulted in the great accumulated knowledge of the biological phenomena of bacteria, which we know as scientific bacteriology. As yet the science is by no means exhausted, in fact, we can say that we are only on the threshold of this great micro-biological science, dealing as it does with all its morphological and physiological phases of both animal and vegetable life; for we are hardly prepared to say yet as to just where the animal and vegetable organisms become a distinct and separate species into the kingdom to which they belong.

The study of micro-organisms, their habits, in and out of the body, both plant and animal, may be said to have begun in the last half of the seventeenth century, when Leeuwenhoek discovered with a microscope, that had been constructed by himself, small organisms which were designated as infusoria. These organisms were found in saliva, putrefying fluids, pus, and in other substances; but their true etiological relations to pathological processes may be said to have begun after the discovery by Koch of the method of isolation by means of artificial cultivation in colloid substance.

The observation that bacteria possessing certain well defined characteristics are always present in certain diseases, to identify their relation to disease, Koch has laid down three rules that must be complied with in order to establish the true etiological relation of micro-organisms with disease.

(1). They shall be present in such numbers as would justify the symptoms of this special disease.

(2). They should be grown in artificial culture media outside of the animal body.

(3). They should produce the characteristic symptoms of this disease when inoculated into susceptible animals.

However, we might say here, there has been some modification in these varied extreme rigid rules laid down as they were at an early period of the discovery of the pathogenic properties of bacteria, and their relation to certain characteristic symptoms of diseases.

It has many times been observed that bacteria have been present in pathological processes which proved impossible to cultivate artificially; on the other hand, it occurred that those cultivated artificially do not always prove virulent. It was observed that bacteria varied in form and in specific action, both in and out of the body; it was also observed that certain bacteria would produce ill effects from their decomposition products. Thus, we see the difficulty that has baffled so many scientific workers in the true classification of bacteria.

A bacterium that produces a disease in man may not produce any disease in the lower animals, so far as is known, while, on the other hand, insects or some of the lower animals which have no ill effects on man, as an illustration, the hay bacillus, which is non-pathogenic to man, produce fatal disease in flies. There are some bacteria, however, that appear perfectly harmless and are classed as non-pathogenic, but under certain conditions they prove harmful to both man and animal. The anthrax bacillus is usually given as one of the most typical forms of the pathogenic type; Pollender discovered this micro-organism in 1849. Davaine and Rayner made some further studies of this germ about 1850.

Koch took up the study and was first to discover the process of spore-formation; this is a non-motile, rod-shaped form when found in the blood of animals, but they grow in long, filamentous form in the culture media. This micro-organism will only grow at a temperature from 12 degrees to 24 degrees C. As we have previously stated, a temperature above 42 degrees materially interferes with spore-formation, as spores are only formed between 18 degrees and 42 degrees C. Free oxygen is necessary also for the formation of spores; thus we see that spore-formation in the animal body will not take place.

There are many animals that are susceptible to the pathogenic properties of this micro-organism; cattle, horses, goats and deer, and certain kinds of the so-called common sheep, while the Algerian sheep is practically immune to the action of this germ. Dogs are more or less resistent. When an intravenous injection is made in dogs, a kind of generalized infection takes place, abscesses arise, etc. Domestic fowls are resistent to this germ, but can be made susceptible by chilling or hunger. Man has more or less resisting power. This infectious disease is quite frequently found in persons working in the sorting of wool or old rags. This infection usually takes place in the lungs; it may also be transmitted to man by the biting of insects that had been feeding on animals sick with the disease.

Buchner has shown that when the spores of anthrax are inhaled there is a general infection instead of a localized inflammation. There is found occasionally contagious epidemics of the skin. It also appears as an epidemic among horses and sheep, brought about through the animal feeding on hay taken from pastures where animals have decomposed after death from the disease. This micro-organism is classed as one of the most constant pathogenic germs yet studied; but, as has been stated, it is possible for this germ to be made to act as a saprophyte.

There has a great deal of experimental work been done to to show how this germ produces its pathological effect on animals. The question arose, whether or not this disease process was brought about through the production of a ptomaine or toxine poisoning. Hoffa seemed to have obtained a ptomaine which, when injected under the skin of animals, produces the characteristic symptoms of the disease, but, as yet, these experiments have not been satisfactorily verified. In 1889 Hankin obtained several interesting products. Martin found by growing the anthrax bacillus in blood serum for ten or fifteen days hewas able to obtain an albumose and traces of peptones which, in its chemical action, behaved very much like peptic digestion. But a farther investigation by Hankins, Martin, Balp, Carbone, Landi, Maltzew, Wesbrook and Klemperer found that this albumose had only slightly toxic effects on animals injected with this substance. Brieger and Frankel obtained a toxalbumin from the animals dead from anthrax; their preparation of the albumose seemed to be possessed with greater toxic properties than that obtained by

the investigators previously named from the artificial cultivation of this germ. Marimer cultivated the germ of anthrax in a menstruum made in the following way:

Water	1,000	grams
Peptone	40	grams
Sodium chlorid	15	grams
Sodium phosphate	.5	gram
Potassium phosphate	.2	gram
Glycerin	10	grams

From this solution the author obtained a specific toxine which seems to have had a very variable effect upon rabbits, when injected with this agent. Thus it can be seen that with the present chemical facilities and knowledge, no definite conclusions have, as yet, been obtained as to just how this infectious process produces the effect that it does upon the animal body. That it is an infectious organism, there is no doubt, and that its action is mechanical is a theory that has been advanced by a number of good authorities, which will have to remain until more light has been thrown upon the subject.

As the anthrax bacillus does not interest us as dentists, still the biological phenomena of this micro-organism is of such great importance in the study of the relation of bacteria to disease that they will always have a place in the discussion of pathological processes.

We will consider here some of the pyogenic bacteria: they are, strictly speaking, those forms which are classed as spherical cocci, which, when grouped together forming a grape-like cluster, are designated as staphylococci, the name being applied to this form of bacteria by Ogston, who was the first to discover them in the tissues of animals in this bunched-like appearance. They appear, however, many times in artificial cultivation as a micrococci. They appear in artificial culture media like gelatin, in three distinct colors or pigment formation; they are thus spoken of as staphylococcus pyogenes aureus, citrus and albus. While the name indicates that these are pus-producing germs and are classed as the true pathogenic, this does not, however, preclude the possibilities of there being other germs that are capable of producing a suppurative foci in the animal tissue.

There is another well known micro-organism that belongs to this class; they are known as the streptococcus, meaning that the cocci are apparently attached together by a gelatinous film, and arrange themselves in a chain-like formation; they are also found

in local suppurative processes. The most typical forms of the so-called streptococcus can be found in the skin infection known as erysipelas. These all grow in the various culture medias that have already been named. The inoculation of artificial culture media from the pus of patients suffering of erysipelas will soon show that these chains gradually decrease in length, until finally there is only the appearance of the single cocci.

This very interesting biological phenomenon is one that leads far into the subject of specificity of bacteria. This phase of the subject will again be referred to in the discussion of saliva and its effect upon the physiological process of micro-organisms of the oral cavity. Right in this connection we might mention that there is a group of bacteria that belong to this cocci form, that vary in their relation to each other. For instance, we may have two cocci, situated side by side or together; this we call diplococci. This form is best illustrated in that known as the pneumococci. The cell is sometimes shaped as a lance, thus the name, diplococci and lanceolatus.

Pasteur was the first to cultivate this micro-organism from ordinary saliva. Later Talamon cultivated this germ from the sputum of individuals suffering with the well known disease pneumonia. He at that time proved that it would produce a septicaemia in rabbits. A. Frankel, however, was the first to prove that it was the true cause of fibrous pneumonia in man. This germ is frequenly found in the oral cavity of individuals who have never suffered with the characteristic symptoms of the disease; to it is attributed the cause of various forms of sore throat. Some observers have gone so far as to state that it was the active factor in 50 per cent of the cases coming under their observation.

A thorough investigation of forty-two cases studied by John C. Cook and myself, we found thirty-one in which this germ was present in the ordinary sore throat. In sixty-one cases where I made an examination of badly decayed lower six-year-old molars this germ was present in twenty-nine cases; from eleven did I obtain virulent cultures. Thus, with my present knowledge on this point, I am forced to the conclusion that its etiological relations to such local pathological lesions as sore throat are not to be dreaded as much as we were at one time led to believe.

A number of investigators have called this germ by various names; Weichselbaum designated it as diplococcus of sputum septicaemia; Miller, in his work on micro-organism of the human mouth, has called it micrococcus of sputum septicaemia. Later

investigators seemed to be rather inclined to the term streptococcus of pneumonia; Lehmann and Neumann are inclined to accept the older term, streptococcus lanceolatus of pneumonia. There are a number of other terms by which it may be called, but it would be of no practical value to give them here. Krouse and Pansini are inclined to believe that the streptococcus pyogenes and the streptococcus lanceolatus is one and the same; the difference between them being only variation due to environment. There is one very evident fact, that in most all cases of both the fibrous and croupous pneumonia, a streptococcus form is most always observed in connection with the diplococcus lanceolatus, and in many of these capsule forms we may also have a chain-like form in the capsule. It is also very true that these forms are more virulent than where we only have a few capsulated forms. (The virulency is exceedingly variable and the usual artificial cultures' pathogenic properties are rapidly lost.) Quoting from Lehmann and Neumann, in man subcutaneous injection from 1 to 2 c.c. of virulent cultures in seven men was without important effect, except local symptoms, some fever and headache.

Dr. Drueck and myself injected rabbits and guinea pigs with sputum; from eleven cases of croupous pneumonia all, with the exception of one, proved to be extremely virulent. We were able to obtain pure cultures of the streptococcus lanceolatus from the blood of the dead animals; these germs were inclosed in well defined capsules, but when growing them in artificial culture medias seven lost their virulency and also the capsule and became a micrococcus. From the other three of these cases they remained as a diplococcus and retained some of their virulent properties.

Right in this connection we will briefly mention another micro-organism that seemed to be closely related to pneumonia. This germ was first studied by Friedlander, who gave it the name of bacterium capsulatum pneumonia. This micro-organism is most always surrounded by a gelatinous wall; thus the name capsulatum. This micro-organism seems as a true coccus. In some instances it produces the same septicaemic condition as it does to the diplococcus; the question naturally arises, Does the bacillus of Friedlander have anything to do with the etiology of pneumonia? With our present knowledge we are forced to the belief that it has nothing to do with the specificity of pneumonia.

Fritsch first identified a micro-organism partaking of all the cultural and microscopic appearance of the bacillus of Fried-

lander; Palteauf and Eiselsberg cultivated this germ from nasal tumors "Rhinoscleroma." I had the privilege of studying four cases with Dr. Charles J. Drueck. We were able to isolate this germ from these small tumors in the nasal passage, and were also able to produce similar growths in the nasal passage of rabbits, but were unable to bring about any pathological lesions of the oral cavity, except in one instance, we produced in about two weeks quite a large fungoid tumor along the buccal mucous membrane, over the second molar tooth. We were able to isolate from this tumor the same organism, but were unable to produce the characteristic tumorous growth from this germ. It will, undoubtedly, under some environing conditions, produce in certain epithelial and lymphoid tissue small, benigning tumors.

It is well to mention here that Mandry isolated from bronchial mucus a bacillus partaking somewhat of some of the characteristics of the germ just mentioned. I two or three times found a germ in the bronchial mucus and in the nasal passage that answered all of the morphological lesions on the mucous membrane of the nasal passage, or the mouth. Fasching and Abel both have cultivated a capsulated bacillus from the naso-pharyngeal space, but, evidently, their investigations were quite incomplete.

Weichselbaum, Lehmann and Neumann have studied a diplococcus intracellularies which was isolated from an individual suffering from meningitis. It is indistinguishable from that of pneumonia. They found, however, that the virulent cultures retained their pathogenic properties much longer than did the streptococcus lanceolatus. This germ is said to have been found in certain secretions of individuals suffering with cerebrospinal meningitis; it seems to have been found in the nasal mucus of a healthy individual.

Perhaps it would be well here to call attention to another micro-organism that has been designated by Kurth as streptococcus involutus. This germ seems to take, on an artificial cultivation, certain peculair characteristics differing somewhat to that of the typical forms of the streptococcus pyogenes. Sometimes a pure growth will take place in which there is present very elongated vesicular spindle forms; other times there seems to be a kind of a halo of the crystalline mass surrounding the chains, resembling somewhat the capsulated forms just mentioned. This germ was early thought to have something to do with the disease known as mouth and foot disease of sheep, but Kurth's latest investigation has led him to believe that it has nothing to do with

this affection. I isolated from the mouths of sheep suffering from some of the typical pathological lesions of the mouth; these forms differed somewhat from the streptococcus pyogenes; I, though, placed little confidence of it being any different from the characteristic forms of streptococci.

Kreibohn seems to have found a capsulated bacilli in the saliva of healthy individuals, a very pathogenic germ, producing death in mice and rabbits in from one to two days; this organism he named bacillus crassus sputigenus. Dr. Charles J. Drueck and myself examined a number of mouths, both sick in bed and those that were out patients of the dispensary, with a hope that we might be able to find a micro-organism that answered all of the morphological and pathological characteristics of this germ. We found, however, a micro-organism answering some of the descriptions of the germ, but we did not find one that gave the peculiar characteristic growths of nutrient media. Dr. Thombaugh (who at that time was interne at Mercy Hospital) and myself found a germ very analogous on some surgical dressing that was taken from the mouth of a boy that was suffering from a fracture of the lower jaw and an external wound on the lip and chin. This micro-organism answered all the descriptions in bacterium question. Miller, in his work on the micro-organism of the mouth, has given a very good description of the bacillus crassus sputigenus.

Koch and Gaffky were the first to discover the very interesting micrococcus that was more fully studied by Biondi and Miller. Its microscopic appearance does not always indicate its name (micrococcus tetragenus), for it grows sometimes in pairs, sometimes as a tetrad; it seldom arranges itself in chain-like form. It grows on most all the ordinary culture media; at times it is extremely pathogenic. Gaffky found this micro-organism to accompany pulmonary tuberculosis. John C. Cook and myself obtained cultures of this micro-organism from the sputum of a number of tubercular cases; in all instances it was extremely pathogenic. Its effects seem to be very much increased when inoculated in a combination of the tubercular bacilli. Rabbits seem to be more immune to the action of this germ than do guinea-pigs or white mice; however, two rabbits succumbed very quickly towards this action. I found this micro-organism in the mouths of healthy individuals. I also found it in the mouths of three persons who had been suffering from time to time for several years, with severe forms of stomatitis. We studied the

saliva and mucous patches in this mouth for six months. He was not of robust constitution and had been operated on twice for hip-joint disease. He was also a sufferer from constipation, for which he was constantly being treated. This case will again be referred to in the discussion of some pathological lesions of the oral cavity. This germ was found by Dr. Drueck and myself in two specimens of milk which were sent to the laboratory for the purpose of determining if there might contain any typhiod germs. It was found from the cultures obtained from this milk, that when grown in bouillon containing a half of one per cent. of milk sugar, that there was a strong acid reaction which lasted from four to six days, and then the media became almost neutral; and when the micro-organism was removed by filtration and the fluid injected into the guinea-pigs, the same characteristic symptoms were produced as in the case of inoculation with the germ itself, with the exceptions that three out of ten guinea-pigs entirely recovered and seemed to be absolutely immune to the action of the germs themselves, while inoculations made into other guinea-pigs from the same tubes caused death in the usual time. We also found that when this germ was grown in the ordinary peptone-bouillon, it did not produce as strong acid reaction, neither did it produce death with the same degree as did the germ grown in the media containing the milk sugar; neither would it immunize the animal against the action of the lethal dose of the germs.

In this connection we might mention the fact that Boutron made the observation of two varieties, which he called micrococcus tetragenus albus and aureus. As their names would indicate, they form pigment; in the culture media they are non-pathogenic. A farther study of these varieties by Boschi and Dellei showed on cultivation that these forms soon become colorless and grow very much as the one above described.

It is well under this head to call attention to the bacillus pyocyaneus; this germ was first studied by Gessard. Under ordinary circumstances it grows as a rod-form; it may also grow in thread-form. It is usually classed as a germ of putrefaction, but undoubtedly it is possessed with pathogenic properties that sometimes manifest themselves in an alarming way. The peculiar color which appears on culture media is due to a pigment of blue-green or leek-green appearance, which is produced by a peculiar chemical substance known as pyocyanin. This micro-organism has been found to accompany certain forms of diarrhoea in chil-

dren. In such cases it is most frequently considered to be of a toxic condition, rather than an infectious one.

In the investigations of Emmerich and Low, they found that pyocyaneus would destroy the virulent cultures of anthrax bacillus. They were also able to show experimentally that rabbits inoculated with virulent culture of anthrax, and at the same time or soon after, if the rabbit be injected with a solution of pyocyanin, followed by subsequent treatment, that the animal was able to recover from the action of the anthrax bacillus.

They were unable, however, to immunize animals against anthrax infection by treating them previously with the bacillus of pyocyaneus. The immunizing substance must be used at the time, followed by subsequent treatment with the pyocyanin, in order to prevent the characteristic symptoms of anthrax infection.

This peculiar coloring matter found in the physiological activities of the bacillus pyocyanin led me to the investigation of the peculiar green stain so frequently found on children's teeth, ranging from infancy to childhood. Dr. Mathews and myself followed out some experiments by first taking the scraping of this substance from the surfaces of the teeth, separating it, far as possible, from the particles of food. In a few instances we were able to precipitate by alcohol a yellow substance which was soluble in water, but it did not impart that greenish tint that is formed when the same process is carried out in extracting the pyocyanin from the cultures of the bacillus pyocyaneus; we did, however, obtain a faintly violet color, which is characteristic of the enzyme of this micro-organism when it is heated with a concentrated solution of hydrochloric acid.

When pyocyanin is heated with caustic potash there is produced an intensely yellow color, and if lead acetate be added, a black precipitate is formed, which is an indication that sulphur is present. In some of the investigations of ours we were also able to detect the presence of sulphur from the green stain. There is beyond question an enzyme in this peculiar stain found on teeth. We isolated a germ from this deposit that had a number of peculiarities as regards its physiological functions. When grown in nutrient bouillon a rather dark precipitate would be formed on the sides of the test tubes, which would give in the majority of cases the positive reaction of pyocyanin. This pigment, when heated in test tubes, deposited itself so firmly that in some instances it was almost impossible to remove it with acid, alkalies, alcohol or ether. The growth and microscopic appear-

ance appeared very much as the bacterium gingival pyogenes, so well described by Miller, with the exception, however, it did not give the characteristic symptoms of this micro-organism; this is really no evidence that it may not have been the bacterium in question, for, as has already been said, the variation of the pathological properties of micro-organism of the human mouth is very much greater than is usually considered by most authorities.

We are unable to find this bacillus except around those teeth having the stained appearance at the gum margin. It was found in three instances in local suppurative processes; of course it was not the only micro-organism present in these cases, but we were of the opinion at that time that the peculiar dark color of the pus was due to this germ, for the pus gave the same reaction as did the pure cultures in bouillon.

On the cultivation of this micro-organism from the pus it gave a more toxic symptom to animals, and when the bacterium was filtered out of the culture media, an intra-peritoneal injection made of the substance in which the bacterium had grown gave positive toxic symptoms.

Miller has described a micro-organism which he has designated as the bacillus dentalis viridans. One of the peculiar characteristics of this organism was that it imparted to the culture media, when growing, a pigment of opalescent green color. This organism was found by Miller in carious dentine. He did not state, however, that its presence was frequently detected in this process. As for myself, I have never found it present in decaying teeth, though I did find a micro-organism that answered all the descriptions of this germ in the cystic formation around the apicial end of an upper central incisor. The serous exudate present had a peculiar green color; it differed very materially from the color imparted to such substance by the bacillus pyocyaneus, in that it was a decided green color. The micro-organism grew in the usual way and when injected into animals, such as mice and guinea-pigs, it would cause death in from twenty-four to forty-eight hours, except when it had grown for considerable length of time in nutrient beef bouillon; it coagulated milk and gave it a bitter, pungent taste. It formed acid only when sugar was present in the culture media. Biondi has classified some four or five different varieties which he found in the mouths of individuals, a staphylococcus salvarious septicus. This group of organisms undoubtedly belongs to the various forms heretofore discussed. The staphylococcus forms are frequently found in the

oral cavity; when I say frequently found, I do not mean that 50 per cent. of the mouths are inhabited with staphylococcus. Out of a hundred and twenty-five mouths, examined by Dr. Drueck and myself, we found staphylococcus albus six times, we found staphylococcus aureus seventeen times, and citrus three times. Of the total number of mouths containing staphylococcus, seven of these produced pus when inoculated into rabbits and guinea-pigs; eleven of the others were made virulent by growing them in a solution containing asparagin, with a half of one per cent. of sugar added. The rest of the staphylococci isolated at that time were absolutely non-pathogenic, and constantly remained so. One of the most difficult things with which we had to contend was to determine a staphylococcus, a streptococcus form one from the other, for different environments in which these germs grow change their physiological function to such an extent that it may prove to be a staphylococcus in one instance, while in another instance, grown almost under the same circumstances, it will be observed that the bunches will practically disappear and we will simply have a micrococcus appearance. The same can be said to be true of the streptococcus, instead of growing in chains they will grow as a single coccus. Experimentally, we have observed a number of facts that might have led some men to say that all pathogenic germs come from the same species. We are well aware of the fact that the anthrax germ remains ever as an anthrax bacillus; it may lose its virulent properties, it may also grow in a filamentous form; it may cease to form spores, and various other changes might take place, but it does not go into another species, neither will it produce any other disease than that known and produced by the anthrax bacillus. The virulent properties of all micro-organisms necessarily ever depend to a more or less degree upon their environing conditions.

It has been shown that any cells once possessed with the vital function can be made to grow when the physico-chemical conditions are present. In the experimental work of Leo Loeb he has found it possible to grow epithelial tissue in blood serum and agar; while he did not grow great quantities, still the development was extended enough that it enabled him to study the variation from the normal.

It was observed that pigmented epithelium would grow in the usual way. However, this tissue will develop, showing all the characteristic appearances of regeneration and degeneration; still it shows in most all cases that the true natural environments

are absent. Thus the possibilities of change in bacteria. For a number of years the differentiation of certain groups of bacteria, one from the other, has been accomplished more generally by physiological rather than upon morphological characters of individual bacteria, or the appearance of the colonies on artificial culture media, such as agar or gelatin, the endless difficulty in separating allied forms. This resemblance of so many different species has given rise to the belief in the interchangeability of these forms, but, when studied from a physiological standpoint, this apparent phylogenetic relationship will disappear. The physiological relationship and differentiation of various micro-organisms of the oral cavity (which is the main gateway to the human body) have received but little attention with regard to their functional activities on the rest of the body. The morphology of bacteria is quite unreliable; their cultural appearance on various media is not always to be depended upon.

It is always necessary to study the physiological phenomena of bacteria in order to demonstrate their chemical and pathological possibilities.

In the study of groups of bacteria like those found in the colon there has been a great deal of work done on such well known bacilli as the typhoid and the bacillus coli communis. This last-named micro-organism was first observed by Escherich. It will grow as a rod-shaped bacterium, also as almost coccus form; the variation in length of the rod is usually influenced by the media, and the age of the cultures. It grows well on the ordinary media; -they grow well at room temperature; they form gas in media containing carbohydrates.

It has been found when grape or milk sugar is fermented by this germ there are produced three well known organic acids, namely, formic, acetic and lactic. Oppenheimer claims to have demonstrated the presence of about 70 per cent. of volatile acids. When this micro-organism is grown in media containing peptones, which must necessarily be the source from which it will obtain its nitrogen, if to this media be added one-half per cent. grape sugar there will be produced levorotatory lactic acid; this chemical process has been observed in about three different forms of the coli bacillus and the bacterium typhi. In this connection there is a very interesting biological phenomenon, for it has been experimentally demonstrated that if ammonia be used as a means of obtaining nitrogen, only one of these coli bacilli will produce this levorotatory lactic acid, while the other two in this group

will produce a different lactic acid known as dextrorotatory. In this process of breaking up media containing peptones, indol is always produced, also H_2S. There are periods in the life cycle of the bacterium coli in which they will ferment cane sugar, with the production of carbonic acid gas; there is also a time when a chemical substance will produce iodoform. The chemical reaction of these forms known as belonging to the true coli group can only be differentiated from other groups found closely allied to them, and is frequently mistaken for the coli bacilli. This colon group not only ferments dextrose and lactose with gas formation, but saccharose. There has been classified by Gartner a number of micro-organisms that have the morphological and same cultural appearance of this so-called colon group. This so-called Gartner group will not ferment lactose or saccharose, neither will they form gas nor acids. In this group Hiss has placed such bacteria as the paracolon, paratyphoid, bacillus typhi, murium bacillus, psittacosis and the bacillus icteroides. There is beyond question certain difficulty met in determining the difference between many of these forms.

In the study of the contents of the intestinal canal in seventeen children, by John C. Cook and myself, there were isolated nine different forms; the characteristic physiological function was different, and yet the general appearance seemed quite the same. Indol was present in 42 cultures out of 57 tested; those grown in media containing peptones H_2S are produced. There have been a number of different media suggested for the differentiation of the typhoid from the coli bacilli; many of these media were used in our work on the intestinal bacteria. The Holy method modified Elener; this media was not altogether satisfactory; we then took up some method suggested by Hiss before the American Association of Pathologists and Bacteriologists. This has unquestionably simplified matters. So far as I have used this culture media in examinations of the city water, it has proven by control test to be simple and accurate. Traces of urea were found in some of these cultures.

Some member of the colon group is found in most all water suspected of typhoid. Out of 48 examinations of city water for typhoid germs, the coli bacillus was found 33 times, typhoid 17 times; found the staphylococcus pyogenes and aureus albus, the latter 6 times, the former 11 times.

[TO BE CONTINUED.]

CAPILLARY ATTRACTION.

An Equation in Inlay, Crown and Bridge Work.

Austin C. Hewett, LL. B., M. D.

In a former article I treated of Capillary Attraction in reference to recurrent decay under Gold and Amalgam fillings. I shall now have something to say in reference to that same almost resistless force which has been and will continue to be an important equation in the problem of tooth preservation and substitution by the use of Inlays, Crowns and Bridges.

One of my critics of the former paper has said, "There is much in the paper that appeals to me strongly; yet my feeling is that you rather over-emphasize the importance of Capillary Attraction as a factor in the recurrence of decay, without giving due proportional weight to the several other factors involved."

Another critic said, in substance, "Well, there will be two views taken of your articles. The careful, thoughtful reader will find much that is new, and that will invoke thought, inquiry and experiment.

"The superficial thinker and careless worker will say 'there is much ado about nothing,' and dismiss the theme."

I am grateful to the latter for his augury, and can only wish that all dentists were as profound thinkers as they are skilled operators.

To the former critic I suggest that I instituted no comparison between Causes of Recurrent decay, but strove with what earnestness I could command to show that Capillary Attraction was *one* ever present, active, potent force with which the operator had always to deal. After a careful re-perusal of what was written, and a reweighing of the points made, I insist that it is impossible to overestimate any source of failure, inherent in the nature of a reparative process. Too much emphasis cannot be placed upon any well defined cause of decay—whether it be primal or otherwise. As logically urge that the defective link in the ship's anchor chain is of small importance; that the trickling rill through a levee of the Mississippi is of little moment. An anchor is lost; the ship drifts upon the breakers; the rill becomes a torrent through a gaping crevasse; plantations are submerged, and men are drowned.

I strove to make the point plain that Capillary Attraction, as a before time unheeded force (as applied to dentinal caries),

was *one* cause of recurrent decay. I now again insist that it is a force in decay.

The scope of these papers is too limited to allow of more than a cursory glance at, a hint of what might be said of decay; *Primary,* or *Secondary,* as viewed and elucidated by Miller, Barrett and other microbiologists of their school; nor is it necessary for my purpose. I simply wish to emphasize facts that may be made apparent to thoughtful, care-taking operators. The microcephalia of the profession I neither care for nor seek to convince.

The facts may be stated thus:

1st. Where oral moisture (foreign to canaliculi dentinum) can penetrate its tubules, or lodge upon its tubule mouths, there microzoa can follow.

2nd. Where a microzoon can find permanent lodgment and supplied culture-pabulum Microzoa are sure to multiply, and according to Miller and Barrett, decay results unless the microorganism meets germicidal doom, antiseptic barriers, or sequestration, and consequent immolation.

3rd. "The mouth is a culture oven of approved pattern, and always supplied with food to appease microbal hunger, and moisture to quench thirst.

"As moisture is one of the elements necessary to the growth of the fungi (microbes) it may be readily comprehended that its entire removal will stop all development."

Barrett's Oral Pathology and Practice, p. 14.

4th. Enamel softening and dentinal decay cannot progress in the absence of moisture.

It needs no argument to prove the four propositions.

Concerning the statement in the former paper that "No one can place a gold or old-time silver-tin amalgam upon tubule mouths and enamel borders so hermetically and densely that their penetralia are *permanently* sealed against *moisture,*" there may be honestly differing opinions. I know and admit that good operators can construct marvels of beauty and utility, if not permanently impervious cofferdams. To such I give heartiest greeting, but venture to repeat to them that in every case they have to meet that insidious, tireless, unrelenting force, Capillary Attraction, so named by scientists, but concerning which no more ultimate knowledge can be gained than of light, heat, electricity, cyclones or gravitation; knowing no up or down, or sidewise; imponderable, and heeding no barrier but dense vitrescent homogeneity, it is and will remain an ever-pres-

ent baffling force: like a quicksand pocket in a tunnel, or a quagmire under a foundation. Dr. Barrett says, in his admirable work above quoted:

"The bacteria penetrate the dentinal tubuli, the acid generated within them through the action of the micro-organism enlarges the tubules, melting down two or more into one, thus forming minute chambers or cavities in the dentine, which ultimately are blended into a yet larger one, and thus decay proceeds. * * * Yet farther into the structure of the tooth have penetrated the bacteria filling the tubuli without having distended them."

Bear in mind that without moisture the microbes could not penetrate.

Other writers have noted this force, but have not appliedly named it. Thus endosmosis is a term descriptive of phenomena of capillary repulsion: illustrated by cataphoresis of a medicated liquid through a diaphragm from the anode to the cathode; more perfectly illustrated still by the formation of endostea by a prolongation of the fibrovascular covering of a bone into its interior, carrying nutrition for the cells through the Haversian canals, and feeding the growth of that delicate vascular lining. By whatever other name—impulsion, imbibition or absorption—this force is ever operative wherever there is growth or decay. Without the moisture potent in both, either would be arrested.

If this is true, then the subject is as pertinent to inlays and crowns (either cupped or doweled upon which bridges rest) as it is to gold or amalgam fillings.

Of late the question, "Why Inlays, Crowns and Bridges Fail," comes up for discussion in societies and journals quite as often as "Why Fillings Fail."

He who would assign apt reasons and does not include this force as operative will surely give faulty answers.

What remedy, then, shall we rely upon? What preventive measures shall we employ?

In this case, as in many others, it is easier to question than to answer.

With inlays, crowns and bridges, I am quite familiar, and in their construction and placing I am credited with some skill. My attainments, however, in this line are very far inferior to those of many of my confreres. Of inlays (other than metallic), I have operative experience of but a small number; probably not exceeding fifty. My success with them has been gratifying and

uniform, but for reasons of antiseptic cleanliness practiced by my patients, and sound, strong enamel contiguous to the inlays, and to positions chosen favoring direct instrumentation, and self-cleansing, rather than to the degree of skill possessed or practiced.

Regarding crowns of the Logan variety, whether used as supports for bridges or far facings, it is clear to me that all dentine should be covered in with attached gum tissue or in lieu thereof, cement as nearly impermeable to oral fluids as possible. I know of no cement so compounded that it will form an absolute cofferdam. My sense of smell has so often been offended that I do not waver the least in that belief. The cement that combines strength of crystallization and resistance to Capillary Attraction is not known to the chemist. The waters of crystallization present in all of them by necessity will invite moisture contiguous into coalescence, aided by the force of the mystic law under consideration. This must be apparent to the thoughtful scientist.

What, then, is to be done? I reply (and the words of the reply flow easily enough):

INLAYS,

whether metallic, ceramic or vitreous, should be so formed that no occlusal force can bear with leverage tending to dislodgement.

INLAY CAVITIES

should be bordered externally by smooth-edged, self-cleansing enamel. Enamel borders should be formed bevel-undercut, with cavity periphery greatest at dentinal propinquity.

INLAY BORDERS

should have external edge beveled very slightly to a less circumference than the dentinal surface edge; a suggestion of watch-glass bevel; and the dentinal surface of the inlay should be slightly concave.

INLAY CIRCUMFERENCE

should exactly equal, when cool, the peripheral curve-lineal measurement of the enamel entrance to the cavity, so that when the inlay, *cold* from the cement and slab, is pressed into the cavity their synthermal degree will cause expansion of the inlay to secure a mechanical holding.

To secure the enamel rods denuded of their cuticula and the dental tubules exposed by decay, burr or curette from oral fluid, and microbic invasion, cover enamel border and dentine with a

layer of antiseptic resin varnish (resin-pinus Sylvestris, dr. 1; absolute alcohol, oz. 1; flour of sulphur, gr. 10). (Note.) Allow the alcohol to evaporate, then cement the inlay home. Care should be taken in placing the inlay not to scrape the resinous film from enamel or dentine. Oral moisture will penetrate any cement containing waters of crystallization, but said moisture will only penetrate to the resinous surface, and if micro-organisms should be *osmosed* to that point they would meet a barrier, and want of nutriment to aid in proliferation.

Does the reader object that I require too nice mechanical exactness of execution? I respond, for the *bungler,* yes. None but the patient, skilled, conscientious operator should attempt inlay work. Greater mechanical marvels will be found in the works of a three or four dollar chatelaine watch that you hang to the short-skirted dress of your little daughter. Is it a hardship that the achievements of the dentist should equal that of the watchmaker?

CROWNS AND BRIDGES.

Of bridges I shall only say that strength should equal the needs of occlusal stress, applied in mastication; he who economizes in gold and solder to the point of possible breakage makes a grave mistake.

The abutments supporting the bridge merit more than passing notice.

The teeth used as supports for the bridge have not only their proportionate share of mastication to perform, but have an added burden in proportion to the number of natural teeth taken from the chasm. The extra burden, however, constitutes the least of ill results attendant upon bridge work. In the preparation of the teeth for crowns, and in the placing of the crowns, lies the real danger; Capillary Attraction is as persistent and more ready for its work, because of the inviting field especially prepared for it. The roots and stumps to be crowned are first of all denuded of their enamel in whole or in part. If of the dowel variety, nature's shield against decay is entirely taken off. Not only that, but the pulp is destroyed and its aid to root perpetuity is gone. In the case of the shell variety, much, if not all, the enamel is stripped away; the exposed dentine incased in a cup designed to be hermetical, but the sealing of which too often is such only in aim.

But it is not my design to emphasize the difficulties of this line of work, especially those that have been noted and in a great measure overcome. There is still this one factor not heretofore applied and met, that remains a hindrance to success—a one cause of trouble. Wherever a crevice between crown and dentine is left, there oral fluids charged with starch, juices of meats, sweets, all an ever-ready "agar-agar" of prime quality, are drawn in by this persistent force. Are micro-organisms left behind? Verily not. Like pilgrims to a shrine they swarm. In this tiny cleft, secure from brush and germicide, antiseptic and deodorant, they distill their acids, and all too soon a slight pain admonishes the crowned victim that decay is nearing a pulp; if the pulp is devitalized, then the decay goes on all the more rapidly, till a crash comes and an abutment is broken, a bridge rendered useless.

What are the remedies? Thorough shaping of the root for easy care in adjustment of the crown to dentinal contact, and a previous prophylactic and antiseptic preparation of root and cement. Do not commit the barbarism of pulp destruction with arsenic in a sound, healthy tooth. The Creator placed the pulp, gave it functions for a wise purpose; and "Thou shalt not kill" is a wise command.

There are devitalized and putrescent pulps enough that we must treat without attacking healthy ones. The now famous anæsthetist, Dr. Hewett, of London, my distant kinsman, gave chloroform to King Edward *only to partial anaesthesia*—the analgic influence—and provided at once more, sufficient for a painless laparotomy. The same benign, safe influence of chloroform awaits your use, in aid of abutment preparation poinlessly.*

When the root is sufficiently ground, adjust the rubber dam closely to gum symphesis. Moisten protruding stump and apply faithfully, stick silver-nitrate to *all* exposed tooth. Re-apply, if necessary, till sensibility to cold contact is destroyed and the tooth is well blackened. It is much easier and consumes less time than devitalization. You will have rendered the abutment insensible to thermal changes and immune to decay.

But to render assurance doubly sure, before setting the crown, dry abutment and coat it thoroughly with the gum resin varnish, and with the cement mix a few grains of sulphur flour. An unexposed healthy pulp thus sequestered by cauterized dentine the salts of silver, varnish, cement with sulphur and gold cap, has never been known to die, and recurrent decay has not supervened. For "facing" crowns, treat the root in the same way (not

forgetting silver nitrate, and varnish in root canals), and fewer failures will plague you.

Note.—The best resin (rosin) I have been able to procure except from Scotch fir lumber or trees, is in the form of "Fiddlebow" rosin made in Germany. First class music dealers and druggists carry it.

*Anæsthesia: Local and General. By A. C. Hewett, M. D. Transactions of Iowa Dental Society, 1895, pp. 62 et seq.

Analgics in Oral and Minor Surgery. *Ibid.* Transactions of Iowa Dental Society, 1901, pp. 93 et seq.

DECISION AGAINST THE GERMAN-AMERICAN DENTAL COLLEGE BY JUDGE CHETLAIN.

State of Illinois, }
County of Cook. } ss.

In the Superior Court of Cook County.

People ex rel. Etienne Stump
vs.
The State Board of Dental Examiners.

This is a petition by the relator, Etienne Stump, for a writ of mandamus to compel the State Board of Dental Examiners to issue to him a license to practice dentistry. The relator claims that on the 30th day of April, 1902, he then being in every way qualified to practice dentistry, applied to the Board for a license to practice in this state, exhibited a diploma from the German-American Dental College, and tendered to it the license fee of $5.00, claiming that he was a regular graduate of said college, and that said college was a reputable dental college, basing his right upon the mandatory provision of the law, which requires the Board to issue a license to any regular graduate of any reputable dental college without examination, and that the Board, without any reasonable cause, arbitrarily, maliciously and with intent to injure the German-American Dental College, refused to grant and issue a license to him. It appears from the evidence that relator made the application to the Board April 30, 1902, exhibited his diploma from the German-American Dental College, tendered to the secretary of the Board the fee provided by law, demanded a license, and that the Board refused to issue it.

The questions involved are of grave importance, because they affect not alone the rights of the petitioner, but also the rights of the German-American Dental College and other dental colleges. The Act by which the State Board is created and under which the petition was filed is entitled, "An Act to insure the better education of practitioners of dental surgery, and to regulate the practice of dentistry in the State of Illinois." In Section 1 it is provided that "it shall be unlawful for any person who is not at the time of the passage of this Act engaged in the practice of dentistry in this state, to commence such practice unless such person shall have received a diploma from the faculty of some reputable dental college duly authorized by the laws of this state, or of some other of the United States, or by the laws of some foreign country, in which college or colleges there was at the time of the issue of such diploma annually delivered a full course of lectures and instructions in dental surgery." In Section 2 it is provided that "a Board of Examiners, to consist of five practicing dentists, is hereby created, whose duty it shall be to carry out the purposes and enforce the provisions of this Act." In Section 6 it is provided that "but said Board shall at all times issue a license to any regular graduate of any reputable dental college, without examination, upon the payment by such graduate to the said Board of a fee of $1.00."

The act does not define what a reputable college is, but vests the Board of Dental Examiners with power to determine this question, which is one of facts submitted to the Board for investigation and decision, which involves the exercise of judgment and discretion, is judicial in its nature, and when once exercised is final and not subject to review by the courts. But the discretion conferred must be fairly exercised in the interest of the public. Where it clearly appears that it has been abused or exercised arbitrarily, or with manifest injury, it may be controlled by mandamus. Dental Examiners vs. People ex. rel., 123-227; People ex. rel. vs. Dental Examiners, 110-180; People vs. McCoy, 125-297.

The questions for this court to determine are:

First—Did the Board investigate, hear and determine the question as to whether the German-American Dental College was a reputable college? *Second*—Did it act upon proper and sufficient evidence? *Third*—Did the Board fraudulently, or without reasonable cause, arbitrarily or maliciously, or with intent to in-

jure the German-American Dental College, refuse to issue a license to the relator?

Upon the hearing certain questions were submitted to the court. It was contended that the efficiency and scholarship of the applicant alone should determine the question of reputability. The character of an institution of learning determines its reputability. Questions as to the efficiency, character and attainments of its instructors, the suitableness of equipment and facilities for theoretical and practical work, for imparting theoretical and practical scientific knowledge, subjects to be taught, the number of lectures to be given, the number and length of the semesters, and the length of time between semesters for practical work, observation and experience not attainable in college, and the general conditions of matriculation and graduation, judged according to standards generally recognized by the dental colleges and the great body of learned practitioners throughout the country, requisite to fit students to enter upon the practice of dentistry and dental surgery, are proper subjects of inquiry and consideration in determining the question of reputability. And I may say that where these are defined by reasonable rules and regulations applicable to all colleges alike, such rules and regulations as to the matters covered by them must be held to be in full exercise of the Board's discretion. But there are other matters equally if not more important, which the Board may consider, such as the failure of a college to observe its own rules and public requirements; whether it is a mere commercial enterprise and graduates students for money without reference to scholarship, or seeks by money or other disreputable means to secure recognition or licenses for its students from the State Board, or is otherwise guilty of conduct which in the ordinary sense of the word is not "reputable."

It will be observed that the law places no limit upon the methods by which the State Board shall investigate and gather information bearing upon the question of reputability. Considering the purpose of the Act, a broad latitude must be accorded, as the law undoubtedly gives the Board the right to proceed in any reasonable way and to exercise its discretion in any reasonable manner it may see fit. It is contended that the Board has no power to establish rules and regulations defining what shall constitute sufficient education and training to practice dentistry, or determine what shall be required to make a college a "reputable" institution. It is further contended that some of the rules and

regulations established by the Board are not calculated to test the real standing of dental colleges.

The purpose of the Act expressed in its title is "to insure the better education of practitioners of dental surgery, and to regulate the practice of dentists." By Section 2 a Board of Dental Examiners is created, consisting of five practicing dentists, "whose duty it shall be to carry out the purpose and enforce the provisions of this Act." While there is no express provision authorizing and empowering the Board to establish rules and regulations, I am of the opinion that the adoption of rules and regulations is clearly within the purview of the Act, and that the Board as an incident to the powers expressly conferred has the power to define its discretion by the adoption of rules and regulations, but these must be reasonable, general and applicable to all colleges alike. Students desiring to qualify themselves to practice dentistry, colleges engaged in qualifying them and the public generally have a right to know what courses of study, requirements and general conditions will entitle a college to be classed as reputable.

I am of the opinion that the Board not only has the power to pass such rules and regulations, but that it is incumbent upon it so to do, and so far as possible to establish and promulgate them as the basis of the exercise of its discretion. The conditions and requirements for the determination of so important a right should not be left to the arbitrary determination of the Board upon evidence and rules and regulations not made public. I have carefully considered the general rules and regulations in force at the time the relator applied for a license, and hold that, with the possible exception of that part of Rule 4 which requires certain evidence of an English education, they are fair and reasonable. The Board may require that all examinations shall be held in the English language, but the provision that one shall not be entitled to practice dentistry in this state who is otherwise qualified, because he does not produce the evidence of a good English education required in that rule, is a doubtful exercise of the power conferred upon the Board. In determining the question of the reputability of the German-American Dental College the Board had the right to consider the requirements prescribed in its rules and regulations then in force, and I find that they did not consider them in passing upon the application of relator. While a general rule or regulation as to any one condition or requirement must be held to be the full exercise of the Board's discretion as to such condition

or requirement, nevertheless, the adoption of general rules and regulations is not the limit of the Board's discretion. It may consider any proper evidence bearing upon the question of reputability.

It appears from the evidence that the German-American Dental College was incorporated in 1888; that Dr. Fritz W. Huxmann is and always has been its dean, and that as early as 1891 and, in fact, ever since its incorporation, the State Board has had trouble with it. Dr. Charles R. E. Koch, who was a member of the Board from 1886 to 1891, testified that at that time he and the members of the Board were of the opinion that instruction sufficient in quantity and quality was not given to make the college reputable, and that the respondent's chief purpose seemed to be to graduate foreigners who did not expect to practice dentistry in this country; and that in 1890 or 1891 it was denied recognition. It appears that it was not recognized as reputable, if at all, until the resolution of the Board of November 14, 1893, making all dental colleges reputable which consented to an examination of their candidates by a member or members of the Board before graduation.

Dr. H. W. Pitner, a member of the Board from May 10, 1897, to August 10, 1901, President of the Board two years, a witness for the relator, testified that the Board had been having trouble with the German-American Dental College ever since its organization; that many rumors were abroad reflecting upon its integrity and the integrity of the members of the Board; and also had trouble with Dr. Huxmann in regard to translations, and the agreement of June 18, 1900. Dr. W. C. Jocelyn, a member of the Board from 1897 to 1901, President of the Board from 1897 to 1899, also a witness for relator, testified to troubles with said college and with Dr. Huxmann.

It appears that in 1897 the Board adopted a list of colleges whose diplomas were recognized as reputable. The German-American Dental College does not appear on it. I do not recall evidence of a single instance where a license was issued by the Board upon the diploma of the college alone. The record does not disclose any inference of recognition from licenses issued upon diplomas, except such as may be drawn from cases where they were issued after examination of the applicants by the Board. In the recitals of the agreement of June 18, 1900, between the Board and the college, granting the German-American Dental College the right to adopt a college course of one-half the dura-

tion required of other dental colleges, it appears that the question as to whether the Board had recognized the college as reputable was in dispute. It is true that the resolution offered by one J. H. Smyser, when a member of the Board, and now under indictment for the gravest offenses committed in the discharge of his duty, was passed, providing that, "in compliance with the laws of the State of Illinois, and in compliance with the rules and regulations governing the Board of Dental Examiners, as published in a report to the Governor for 1899, the diplomas of the German-American Dental College will be recognized." But the form and meaning of this resolution were at once questioned, and August 12, 1901, by a unanimous vote of the Board, this resolution was rescinded and a substitute was passed, providing for recognition of the German-American Dental College only upon compliance with the general rules and regulations of the Board then in force. This resolution also provided that the Board accept a consecutive course of study of eighteen months at the German-American Dental College as equivalent to a full three years' course of study in the English-speaking schools, which was in direct violation of the general rules and regulations then in force.

It will be seen that through influences not fully disclosed by the evidence the German-American Dental College frequently sought for and obtained special privileges from the Board, that it was a constant source of trouble, and that its standing as a reputable college was continually in dispute. If compliance with the rules and regulations of the Board be the test, the evidence fails to show that said college was ever at any time entitled to recognition. In this connection I may say that the agreement of June 18, 1900, giving to said college the right to adopt a college course one-half the duration required of all other dental colleges, which conferred upon it a special privilege not granted to other colleges, was in direct conflict with the general rules of the Board on that subject (which the court holds to be the measure and limit of the Board's discretion), was manifestly entered into not for the benefit of the public, but for the private benefit of the college, and was therefore null and void. Likewise, that portion of the resolution of August 12, 1901, above referred to, conferring a special privilege as to the time of study so far as it seeks to exempt the College held to be a clear abuse of the discretion of the Board, and absolutely void, and the German-American Dental College, the illegal beneficiary of the special privilege thereby conferred, can not receive any benefit therefrom. All other similar acts from said

Board must be held for naught. Where the Board, whether actuated by proper or improper considerations in the exercise of its discretion, by rule, resolution, agreement, contract or other action, exempts any college from the operation of its general rules and regulations, such action must be held a clear abuse of its discretion and therefore void.

On April 30, 1902, when relator applied for his license, it may be fairly inferred from the evidence that the members of the Board were cognizant of all matters of record touching the German-American Dental College. Dr. J. G. Reid, at that time a member of the Board, had been on the Board for a number of years, and was acquainted with the College, its previous history and its Dean. The evidence shows that relator made his application personally and by attorney appeared before the Board. He was informed that the Board was not satisfied that the German-American Dental College was a reputable college, and the Board asked for further information. While there is some conflict in the evidence, several witnesses testify that the Board asked for a schedule of lectures, and that the relator and his attorney then left. May 1, 1902, the relator and his attorney again appeared before the Board. They submitted only a catalogue, which the Board already had, and the relator, through his attorney, told the Board that they were not obliged to furnish further evidence, and declined to do so, basing the relator's rights upon the diploma. The Board thereupon took action, the record of which is as follows: "The application of Etienne Stump for a license on a dip-"loma from the German-American Dental College was renewed "before the Board and refused for the reason that the Board was "not satisfied with the reputability of the German-American "Dental College."

The Court holds that the foregoing action of the Board was in effect a determination by the Board that the College was not reputable, but whether or not this be so, it appears from the evidence that there was a hearing of the question and the special request made by the Board for further information. The burden of furnishing further evidence and demonstrating the reputable character of the College was on the relator and not on the Board (State ex. rel. vs. Chittenden, late decision Supreme Court of Wisconsin). Especially should this be so in this case, where it is conceded that the college had not complied with many of the general laws, rules and regulations of the Board then in force, and had not complied with Sub-rule 7, which imposes the duty

on all colleges seeking recognition to submit certain information to the Board. The printed catalogues and literature of the College as to the time of study and other requirements were in direct conflict with those of the Board. In argument much stress was laid on the claim that the Board had previously recognized the college as reputable. Even although it had been so recognized, the Board had the right at any time for good cause to withdraw such recognition, a right which the Board very properly saw fit to define by a special rule.

It further appears from the evidence that in October, 1901, all the members of the Board visited the college, and they testify that they were not satisfied with the facilities and equipment of the institution; that they found no schedule of lectures, and obtained only such meager information as appears in relator's "Exhibit 2."

The printed literature of the College contains what purports to be, but what is not, a copy of a letter from the Governor of this state. It was evidently published and circulated for the purpose of impressing the public with the belief that the College was a college in regular standing and had been recognized by the State Board since 1893, and that a communication from the highest official source attested the fact that the records of the Board of Dental Examiners so showed. I cannot but feel that this copy was deliberately made for an improper, selfish purpose, and was well calculated to deceive the public.

It is fair to infer from the evidence that the Board was in possession of all these facts at the time the relator made his application for a license.

The Court upon the hearing, against the objection of relator, admitted evidence of the general reputation of the College April 30, 1902, only, however, upon the promise of evidence to show that the members of the Board had knowledge of such general reputation at that time. This evidence was admitted upon the theory that the Board might avail itself of all knowledge from all reliable sources, and might possibly consider the fact of general reputation. Although upon the issue it was entitled in any event to but little weight, it might with all other facts in evidence then before the Board be considered on the hearing. It was shown that Dr. Reid at that time had knowledge of the general reputation of the College.

I therefore find from the evidence that the Board heard and determined the question as to whether the College was a repu-

table college; that it had before it competent evidence, both direct and circumstantial, touching upon the question. I therefore hold as a matter of law that its action was final. The cases cited above, and many others too numerous to mention, fully sustain this proposition.

The evidence fails to show that the Board or any member of the Board acted arbitrarily, without cause or maliciously, and with intent to injure the College. All the members of the present Board took the stand. They testified like fair men, having no feelings of enmity or revenge, no private interests to serve. The record fails to disclose any motive on their part to act arbitrarily or maliciously. By profession they are practicing dentists, apparently men of large experience, scholarly attainments and high character. Their testimony, and their conduct and demeanor while testifying, impressed me with the bellief that in passing upon relator's application they were actuated solely by desire to fairly and impartially consider and determine the question as to the reputability of the College, and that the action taken was the honest and deliberate judgment of the Board. Counsel to justify the issuance of a writ of mandamus sought to affirmatively prove that the College was in fact a reputable College. In this I think he failed. Upon that issue a wide latitude of proof was allowed.

It appears from the evidence that Dr. Fritz W. Huxmann is, and has been, the head and front of the institution, I might say its greater part. It appears there were no meetings of the faculty, and no regular books were kept, and when counsel for the respondent asked for the book containing the names of students who had matriculated, it was not produced. The attitude of Dr. Huxmann was inconsistent. While claiming the benefit of the law and to be entitled to recognition, he utterly ignored the rules and regulations of the Board, sending out catalogues and prospectuses since the adoption of the rules and regulations October 18, 1901, showing a course of study of only three successive semesters of six months each, in direct violation of such rules and regulations.

While I have nothing to say against the worth and standing of the doctors who were instructors in the branches assigned them, I think upon a fair and impartial consideration of all the evidence any disinterested person would say that the chairs of the institution were not properly filled. There was an entire lack of harmony between the members and the so-called faculty.

In fact, some were not even acquainted with others, and their appearance on the witness stand did not impress me with the fact that they were imbued with the high spirit and appreciated the great responsibility that are attached to their positions. The evidence shows that in matriculating students Dr. Huxmann did not always observe the conditions prescribed in the rules and regulations of the Board. If the testimony of some of the witnesses may be believed, Dr. Huxmann promised speedy graduation, contrary to the printed requirements of his College, as well as those of the Board, and during an examination by the State Board he furnished answers to questions to his students in advance. The evidence shows that part of the time for the past ten years Dr. Huxmann was himself a member of the Board and was closely associated with the members of the Board, and a part of that time was translator for the Board of the examination papers of the students from his own College; that he continuously sought and availed himself of advantages and privileges not accorded to other colleges, in direct violation of the rules of the Board. Whether these concessions were the result of sinister influence, or the unsolicited favors of the generous Board, we are left to conjecture. They were at least illegal and unjust. Several letters of the Dean were read in evidence. While not going into the details as to the matters therein contained, suffice it to say that they were of a character and upon subjects not such as to exemplify his fitness for a deanship, and tend to afford corroborative proof that he does not fitly represent the dignity of his position as Dean of an institution which claims the right to, and does, confer degrees.

The evidence is conflicting on the question as to equipment and facilities. The members of the Board visited the College at an inopportune time, when a change of location to a new building necessitated moving, and at a time when installation had not been completed. While not elaborate, I think it may be justly said that for a small institution the College was fairly well equipped.

I shall not take time to further point out and particularize any of the facts which were elicited upon the hearing, but find from all the evidence that the relator has failed to make out his case by a preponderance of the evidence. The tendency of the times in all departments of human endeavor, and especially in the professions, is to require of students a more thorough and comprehensive knowledge of the subjects, greater opportunities

for theoretical and practical instruction, larger courses of study and greater general efficiency. It is to be regretted that the equipment, facilities and advantages suitable for adequate and thorough education render it almost impossible for poor men, however ambitious and learned, to properly prepare young men for their lifework and equip them with the knowledge and practical experience in all departments of study which render them proficient and worthy of a degree, but the poverty of worthy men is no excuse for failure to observe the reasonable requirements of the state for the protection of its people from unskillful and uneducated practitioners. Equally untenable and unworthy is the suggestion of the Dean of the German-American Dental College, that the influences of college trusts, of which there is no evidence, and the action of the Board in establishing severer requirements for matriculation and graduation indicate a desire to discriminate against the German language and German institutions. If the Board has erred in this regard, it is in following the example of Germany, whose requirements exceed those of any other country, whose scholars lead the world in thoroughness and proficiency, and whose schools of learning are the glory of that sturdy people.

Upon a careful consideration of all the evidence in the case, I am constrained to deny the prayer of relator's petition, and the petition will be dismissed with costs to be taxed.

REPUDIATES THE GERMAN-AMERICAN DENTAL COLLEGE.

CHICAGO, August 21, 1902.

Dr. J. N. Crouse, Editor DENTAL DIGEST.

DEAR SIR:—I hand you this letter for publication in your journal. I am through with all controversy with the State Board; in fact, I ought never to have had any. My troubles began when I was lured into becoming a student at the German-American Dental College. When I came to Chicago late in 1900 I was a stranger in America and a stranger to American institutions. I had letters of introduction to reputable schools, but thinking it would be best for me to matriculate at the German-American College, I did so.

I was influenced to enter this college because of my inability at that time to readily comprehend and speak the English lan-

guage, and also by reason of the catalogues and announcements of the college which came into my possession and attracted my attention while I was in Europe. The statement was made in the college literature circulated all over Europe that it was a reputable institution, and that its diplomas were of equal value with those of any reputable dental college.

I had no information to the contrary until some time after I had matriculaated and become a student of the College. I had not been there long before I began to see many things I did not like, but I kept along until the College graduated me in April, 1902, being assured all the time by Dr. Huxmann that everything was all right and that I would get a license on my diploma to practice dentistry in Illinois. I presented my diploma first to Dr. Reid, the Secretary, and then to the State Board, and was refused a license by both. The remainder of the story is told in the mandamus proceedings just decided by His Honor, Judge Chetlain.

While I was a student in this College, and when I filed my petition for mandamus against the State Board, I knew nothing of the ugly facts in the possession of the State Board and disclosed on the hearing, which were so decisive of my case and the fate of the German-American Dental College. I do not see how the court could have decided differently from what it did; I am fully satisfied with the justice of that decision, and from it I shall take no appeal, for I think that it deserves to be considered final and as marking the end of the existence of the German-American Dental College.

I filed my petition in good faith, and had the aid of able counsel, but no counsel could cover up Prof. Huxmann's many frauds, which constantly came out in the evidence against him and his college. I am only one of many victims of the German-American Dental College, Dean Huxmann, and its so-called "Faculty."

There seems to be nothing for me to do except to join with Dr. Frida Mueller and compel the College and its dean to make restitution to me of what they have obtained by fraud. Accordingly, I have retained John W. E. Wayman, Esq., of No. 813 Association Building, Chicago, as my counsel and attorney to prosecute them and get my money back, and I would advise all other victims to do likewise. I have the honor to be,

Very truly yours,

(Dental Digest.) ETIENNE STUMP.

HIGH FUSING VERSUS LOW FUSING PORCELAIN.

BY W. T. REEVES, D. D. S., CHICAGO, ILL.

(Read before the Wisconsin Dental Society, July, 1902.)

Mr. President and Members of the Wisconsin State Dental Society:

In presenting a paper on this subject for your consideration to-day, I do so with two objects in view. First, to clear the atmosphere for the uninitiated in porcelain of what must seem to them a befogging difference of opinion among porcelain workers as to materials and manipulation as advocated in papers and discussions before dental societies and printed in our leading dental journals in the past few years, and to try and start them on the right road that, if followed diligently, will lead to success; second, to give added stimulus to you who are workers in porcelain by showing you an ever-increasing scope for the use of porcelain as a filling material as you gain experience in its use and the confidence that comes from a more extended use, and by comparison of materials and methods to bring out what is best, and to give you some new principles that are fundamental principles in inlay work, that, if studied and followed, will give you increased success in this work.

High fusing versus low fusing is a great bone of contention. In all combats, controversies or arguments one must have an adversary as well as a principle to combat, and that the low-fusing contingent may have as strong an advocate as I know of, I have taken the paper read before the Second District Dental Society in Brooklyn, and the Boston and Tufts Dental Alumni Association lasts December, by Roderigues Ottolengui, M. D. S., and printed in the April number of the Items of Interest. Dr. Ottolengui is one of the most forcible and brilliant writers in America and an enthusiastic advocate of the Jenkins bodies and methods, and if I did not believe I had the best end of the argument I would not voluntarily seek so strong an adversary. I have a great admiration for Dr. Ottolengui, and whatever is said in the way of criticism is said with the friendliest feeling and in criticism of material and methods, and nothing personal toward him or Dr. Jenkins.

There is a common ground that we all stand on regardless of the creed we believe in—that is, Availability and Compatibility. Availability has been well handled in a conservative way,

and I endorse in the main all that has been said on that subject, and would only criticize the limitations that have been placed on porcelain. I believe that porcelain as a filling material is only limited in availability by the limitations of the operator to perform any given case in hand. As an operator acquires skill in making and inserting porcelain fillings, he will successfully advance from one class of cavities to others more difficult until he handles easily and successfully those that at first seemed impossible, and as he overcomes one difficult case after another, he will gain the confidence and skill that will enable him to restore the worst broken-down teeth to full contour and usefulness with porcelain fillings, and thus practically place no limitations on porcelain as a filling material.

I speak of acquiring skill advisedly, for there is no work that the dentist does that requires such painstaking care at every step as the making of a porcelain inlay, and the technique cannot be mastered in a week or a month, but must be a year-in and year-out study, for each case presents a different problem and new possibilities, and in no work we do does the saying, "Eternal vigilance," apply with such force as in inlay work, for the operator can never let himself down from the highest plane attainable. There can be no medium or indifferent work, no slighting or hurrying at any step, or a failure will be the result. It is the one work we do that the operator knows beforehand whether it is a success or not. An inlay must be a perfect fit or it should never be set. It may be an indifferent match in color, but if a perfect fit it will do perfect service to the patient. In this way it will cultivate a high moral tone in the profession, for no one is worthy of being a member of a liberal profession who will knowingly complete an imperfect piece of work.

Compatibility is a common ground for us all, but has never been recognized as one of the best qualities of porcelain as a filling material. It is a quality that no other material we use possesses, and consequently it is no wonder that it has escaped mention, if not the notice, of the inlay workers. Dr. Ottolengui touches on it in speaking of "Advantages of porcelain in saving teeth," but does not give it the distinct place that it possesses, or the credit to porcelain of a quality that to my mind is one of the greatest qualities that a tooth-restoring material could have.

Compatibility of material to tooth means a great deal. If nature could, after the removal of all carious portions of the tooth, restore to full contour by building in dentine and enamel

as she restores in other parts of the human economy waste or loss, it would be the perfection of restoration; but nature cannot do this. Porcelain does this very nearly to perfection, so nearly that the eye cannot detect the artifice, and all the functions of the tooth are restored to a normal condition with the one exception of sensation in the restored portion, but as long as caries does not attack porcelain it does not need that quality in order to warn the patient of impending danger.

A few statements that apply to inlays in general I want to take exception to, one to emphasize and then quote the Doctor in full on what he says about "Advantages of porcelain in saving teeth," before passing to the strictly high and low fusing phase of the paper. The Doctor says: "American dentists and American patients have a different attitude towards the porcelain filling. Both admit that it is beautiful. But the patient, accustomed to the gold filling, which, properly made, is looked upon as a final operation, when the idea of porcelain is suggested, almost invariably asks, "Will it last?" And with the exception of a very few men, who seem to have overstepped the bounds of discretion in adopting this new method, the question proves embarrassing to the dentist."

As one who is not embarrassed by this question, I take exception in behalf of those hit at, that we have overstepped the bounds of discretion, and to also answer the statement appearing in the next paragraph, "Very few Americans as yet ask us for porcelain fillings. Such as are made are inserted upon the suggestion and by the advice of the practitioner, and in spite of the query, 'Will it last?' " I have been putting porcelain fillings in since 1893. For about the first five years I only put them in for those who asked for them, and at their own risk, they having seen the work in some patient's mouth and wanted the same for themselves. As the number increased and I became more proficient in the work, the scope of cavities enlarged until it embraced all parts of the mouth; the result of the more extended use was the proving them to be the most permanent of any fillings those patients had. It was only through a slow, cautious and careful use of porcelain that it has become the chief material I use today, and why I am not embarrassed to answer the question, "Will it last?" And also why I place it first instead of second as compared with gold.

On the same page in the last paragraph the Doctor says: "In spite of the artistic influences of Europe, I cannot abandon

the theory that the dentist's *first duty* is to *save* the tooth, and that it is but a *secondary* demand that it shall be done in an *artistic* manner." I cannot endorse that sentiment too strongly, for that is what I believe in first, last, and all the time, and that is why I recommend porcelain, because I know it will save more teeth under more varied conditions than any other material we use.

The Doctor seems to have lost heart and then to have regained his courage. I will quote, without comment other than to predict that within five years he will place porcelain second to none, particularly if he adopts high fusing porcelain for making his inlays. He says: "I believe that the radical, impetuous use of porcelain will within five years leave the method hidden away on the top shelf of abandoned practices, alongside of cataphoresis and copper amalgam. On the other hand, I firmly predict that a conservative application of porcelain fillings will show an increasing use of the mode, giving it a permanent place, second only to gold; for, despite my admiration for porcelain, I will not permit myself to forget that the corner-stone and foundation of successful American dentistry is the permanent-contour gold filling."

Continuing under "Advantages of Porcelain in Saving Teeth," the Doctor says: "Viewing porcelain, therefore, from the American standpoint, where, when, and how shall we use it? Perhaps its chief attractiveness will always be its resemblance to tooth substances, but I would call your attention to other important virtues, two in particular: First, it is a poor conductor of heat; second, it is made out of the mouth and inserted complete. Either of these, and especially both combined, will in many instances elect porcelain to a precedence over all other materials.

"Let me speak of it first from the aspect of its poor conductivity. While modern practice preaches that the dental pulp is often better out of than left in a tooth, this very dogma has arisen from the fact that a metallic filling in close proximity to the dental pulp endangers the vitality of that organ. It is because of the constant death of pulps under large gold or amalgam fillings, with consequent abscesses, that we have come to see that, in many instances, and considering the perfection of antiseptic treatment to-day, it is a safer and a wiser proceeding to remove the pulp prior to inserting the filling, rather than to risk its sudden death and infection of the apical regions. This is unu-

doubtedly sound doctrine, but it is applicable only in proportion to the age of the patient. That is to say, the younger the patient the less excuse have we for intentionally devitalizing a pulp. In view of this self-evident fact, even the most radical destroyers of pulps bend every energy towards the conservation of the pulps in young teeth, and to this end they pin their reliance to temporizing with plastics. Here, then, we arrive at a point where even the American dentist discards gold and utilizes a material which is perishable in the environment. Here, then, we find a class of cases where porcelain must appeal to us, not because of its beauty, but because it is more permanent and more conservative of the health of the tooth than any other material in our cabinets.

"Coming to the second advantage, the fact that the filling is made out of the mouth and inserted quickly and in one piece, we find that once more it appeals to us in exactly those places where we reluctantly discard gold. That is, there are many localities where, because of the time required for a gold filling, it would be impossible to maintain dryness of the cavity sufficiently long to permit us to insert a perfect gold filling. Many such cases will occur to your minds, so that I need but mention a few. Some of the most beautiful fillings that I have seen made by Dr. Jenkins have been along the gum margins, on the buccal surfaces of lower molars, the fillings being half under the gum. We all have had the experience that even after the use of gutta-percha or other packing to push away the gum, we have met such a flow of saliva as to preclude the successful use of gold, so that we have been compelled to rely upon amalgam. Here it is possible, it is wise; nay, I will say it is the very best practice to use porcelain, and yet it is a situation where the beauty of the work is absolutely unimportant. In true American fashion, we choose it because it is the most durable and the most useful material.

"Another difficult position is where the improper use of clasps has resulted in abrasion and subsequent caries about the necks of molars, usually extending below the gum and commonly very sensitive to the touch. Amalgam is the common reliance, and too often the electro-chemical action caused by the contact of the gold clasp with the amalgam filling leads either to reappearance of caries or death of the pulp. Here is a place where porcelain is useful, both because it is a non-conductor and because it is made in a single piece and may be quickly inserted, requiring a minimum period of dryness. I show a specimen of this class of work where it will be noted that the cavity has been cut entirely

below the line of enamel, a fact which would almost always preclude the successful use of gold, whereas it does not greatly hinder the utilization of porcelain."

Next the Doctor speaks of the use of pink porcelain for those cavities that occur on the root, following extensive recession of gums. Here I differ with him. I have never seen either in crown, bridge or inlay where pink porcelain has been used to restore absorption or recession of gums and had to set against natural gum tissue but that it showed up as plain as black and white. I believe a more artistic effect and less conspicuousness is secured by making that portion of the inlay that should be covered by gum tissue to look like root in contour and color and let the effect be denuded root rather than several colors of attempted pink gum. I have some samples that will show what I mean by this treatment of such cavities; they will be exhibited at my clinic.

Again, the Doctor says: "I believe that there is a general feeling throughout the country that the high fusing porcelain is the more reliable. This has come about by the constant repetitions of a few writers favoring high fusing bodies." Again he says: "I have endeavored to make matrices with platinum, some being in one instance furnished to me by Dr. Head, from which I may argue that I have experimented with the proper kind of platinum. In my hands, at least, the platinum matrix limits the use of porcelain. * * * * But I find, and think the fact cannot be disputed, that in proportion as the size and depth of the cavity increases the platinum becomes less and less a possibility. This, if true, entirely discounts the high fusing method, for the only advantage that even its most ardent admirers claim for high fusing material is that it is stronger, which, however, is not true. But for a moment admitting this,we must allow that in proportion as the porcelain is exposed to the stress of mastication, the demand for strength increases; yet it is exactly in compound cavities that the platinum matrix becomes increasingly inaccurate in relation to the extent and depth of the cavity."

In the foregoing, he says the only point that high fusing advocates claim is strength. At least it is as strong as Jenkins body, and it may be stronger. Both, I believe, are strong enough, and as that is the least of its many points of superiority, I will pass that over without argument.

His great bugbear seeems to be the burnishing of platinum into extensive cavities. I claim this for platinum: That wherever anyone can burnish gold into a cavity to form a matrix, I

can burnish platinum and will have as perfect or a better matrix, and that there are a great many extensive compound cavities in which I can burnish platinum and make a perfect matrix; that if gold were used, even if they succeeded in removing the matrix from the cavity, it would be so frail that subsequent handling while baking the inlay would warp and bend it all out of shape, so that it would be absolutely no good as far as fit is concerned.

Platinum can be burnished anywhere and everywhere. It takes a little more time, but when completed it has a rigidity that enables you to handle it freely with perfect security as to changing shape. In difficult cavities I will burnish a matrix from start to finish in from fifteen to twenty minutes. Suppose it takes 50 per cent. more time; the more perfect results you obtain from a platinum matrix more than pay you for the time spent in burnishing. The point he makes for gold is a still stronger point for platinum, that of being able to overlap the tooth with the matrix, so as to give you an impression of the tooth as well as of the cavity. You can overlap platinum on to the tooth to any extent, just so that it doesn't go beyond the bulge and bind itself in, and it will be rigid, so as to be of some beneefit to you while building, carving and contouring your filling.

Translucency is one of the main features desired in inlays or fillings. Jenkins bodies are opaque, hence you cannot make a translucent natural looking inlay with them. High fusing bodies are translucent, and by building your inlay up in layers you can handle your colors so as to give a perfect natural looking, translucent inlay.

This one point is enough to establish the superiority of high fusing over low fusing bodies, but there are other points. Here I want to give you a fact or principle that has been overlooked by inlay workers, and it is one of the greatest points in favor of porcelain as a tooth-saving material. Gold, either in the form of filling or crown, no matter how highly polished, will tarnish and retain fine patches of food deposit, and increase the liability to decay of approximating tooth surfaces. Normal enamel is attacked by the acids of the mouth and roughened, and will then retain increasing amounts of food deposit, and caries follows. But porcelain, with the glaze of the furnace, will not retain any deposits in the slightest degree, and is not affected by the fluids of the mouth. Therefore, that tooth that has for contact point or approximating surfaces the glazed surface of a porcelain inlay is

protected from the liability to decay to a greater extent than it was originally.

On this clinical fact I base this statement and make a strong point for high fusing as against low fusing. *Inlays should never be ground on any surface other than the occlusal surface of molars and bicuspids and the cutting edge of the anterior teeth, without being returned to the furnace and glazed before setting.* High fusing bodies are the only bodies that you can build up contours, carve and shape and will retain those shapes under the heat of fusing, or, if you have over-contoured, you can grind to desired shape, then put into the furnace and glaze with the certainty that it will be that shape when it comes out. All low fusing bodies have a tendency to make a spheroidal or globular form in fusing, just the same as solders do; hence the wartlike appearance of inlays made of Jenkins body, and the consequent necessity of grinding them after they are set and then polishing them. The Doctor says: "I also find that after setting a filling, should it seem requisite, the margins may be polished with strips as safely as where metallic fillings are similarly treated."

You see their claim is a boomerang, and that the necessity of grinding their margins down to the plane of the tooth destroys one of the best qualities of porcelain as a tooth-saving material.

The Doctor, under "Method of Construction," says: "A necessary result has been that the sole reliance for retention has been the so-called cements. The failures of porcelain have been almost exclusively due to the failure of the cement. * * * Having the advantage of observing Dr. Jenkins at work, I noted the manner in which, with diamond-copper disks, he cut grooves in the porcelain, and I saw at once the advantage of his method. as well as the fact that it had never been adequately explained in print," and further on he describes a new cavity formation, with the hope that he has solved the problem; the new cavity formation he suggests he likens to the "sliding cover of a wooden box."

I want to answer all of these by giving you what I think is the true reason why Inlays and Restorations stay, a new principle that clinical experience has demonstrated.

Close adaptation and the medium of completing the close adaptation crystallizing under pressure. You take two sheets of glass whose surfaces are adapted to each other, and place water between as a means of excluding all the air and completing the close adaptation, and you cannot forcibly pull them apart. A joiner prepares the surfaces of two pieces of wood so that they are

in close adaptation one to the other, places glue between and clamps them together and leaves them to harden. There is no strength in the glue; if there was any appreciable amount of glue between the boards, there would be no strength in the joint. It is on the same principle, I believe, that inlays depend for their strength of retention. If this be true, there is no need of cavity formation such as described, no need of inflicting the pain on the patient that would be occasioned by the additional cutting such formation would necessitate. Cavity formation should tend to simplify the task of making a matrix, while this style of cavity formation would seriously affect the chance of being able to withdraw the matrix without distorting it.

Dentists through all the years have been brought up on one law of physics: Self-retention form of cavity and interlocking form of filling, and it seems almost impossible for them, or inlay workers either, to break away from this law.

That there are other laws of physics that dentists have never made use of, that would be of great benefit if utilized, there is no doubt. That this law of close adaptation is one of these that is destined to be of great benefit to dentists, I firmly believe, and the more it is followed the more confidence in porcelain fillings will be the result.

What strength can there be in a line of cement that would fill any groove you can cut in the reverse side of an inlay? I believe that just to the extent that you groove the inlay you have weakened the strength of retention. All inlays, large or small, extensive restorations in molars, and bicuspids, and corners and tips on the anterior teeth, I etch the reverse side with hydrofluoric acid, which removes the glaze and leaves a slightly roughened surface, without changing the close adaptation to interior of cavity as well as at the margins.

I will close by quoting the last sentence of Dr. Ottolengui's paper. The Doctor says: "While I believe that in numerous instances porcelain may and should be selected because it is the more artistic material, I also believe that those who take up its use first in those localities where it can be relied on as the most permanent and most healthful conserver of the teeth, will learn by their experience and gain such skill in manipulation and management that, when they essay the use of the material mainly as a beautiful restorer of lost tissue, they will achieve a higher success, a more permanent result for their patients and establish a more lasting utilization of porcelain as a filling material."

IDEAL FILLING MATERIAL—CAN IT BE FOUND.

BY R. B. TULLER, D. D. S.

We are in the habit of saying, not to say believing, that dentistry is a science of comparatively recent origin; but evidence reaches us from time to time from archæological explorations that it was a practice, if not a pronounced science, of very ancient date. How ancient no one knows; but mummies exhumed from the tombs where they have lain for several thousand years present specimens of the art as practiced in their day. If there is evidence of any other material than gold I am not at this writing aware of it. The art of beating gold into leaves or of reducing it to some crystalline form like unto the crystal golds of to-day must have preceded its use as a filling material, for in no other form so far as our knowledge goes could it be packed into the cavity of a tooth in a way to prèserve it. Gold was probably used then for the same reasons that we use it now. Lacking anything better, presumably, a metal seemed called for, and gold filled the requirements in purity, strength and adaptability better than any other, as it does to-day; and more than likely the art of using it has been handed down from generation to generation along the ages until it came to our time. Possibly, to be sure, it may have been a lost art at some period, and has been rediscovered. "History repeats itself," and "Necessity is the mother of invention."

The ingenuity of the Yankee, a genus homo of a modern era, has done more, probably, than was ever done before in the developement of the dental art as it is known at this date. Considering the wide diffusion of a knowledge of methods of using gold to fill cavities of decay in teeth, it has been looked upon as coming nearer the ideal substance than anything else in general use; for probably every dentist in practice to-day knows how to fill teeth with gold. To those dentists skilled in porcelain filling, or more properly inlay work, that substance appears to them nearer the ideal. But an ideal filling material, along with its other properties, must have that also, it would seem, of general utility, and the intricacies of porcelain inlay work done as it must be done to be mentioned as ideal are beyond the skill of the average dentist. Possibly that may be the fault, or perhaps I should say the virtue of anything approaching the ideal material. If the ideal can be reached it may be only by a higher order of skill,

artistic taste and aesthetic sensibilities than the average dentist possesses.

I need not take the time or space here to go into a discussion of the properties and virtues of other matrials in general use for filling teeth; we all know the pro and con of every one. We all know, too, that the ideal, in all that that word implies, has never yet been discovered. In this day and age of the world, with the marvelous inventions and discoveries, especially in the liberal arts, that have startled and amazed even the broad intelligence of our times, is it not a little surprising that we are still *plugging* pretty closely along the line of the ancients of many centuries back? It surely is not for the lack of effort on the part of some of our best talent that the ideal has not been reached. It has long been sought, and is still being sought by men whose brain and ambition lead them to continually persevere in research and discovery; but, alas! the laity seem content to plod only in beaten paths.

Who can name the properties that one and all must enter into an ideal filling material? Perhaps it may never be found until we are as wise as the gods. We may approach the ideal as in porcelain inlays, but there is much to be desired when we have reached the most up-to-date perfection of that art.

Some twelve or fifteen years ago, before the porcelain had come very much to the front as a substance to repair ravages of decay that were less than the requirements for an entire crown, it was my privilege to hear that eminent old practitioner and thinker, Uncle George H. Cushing, express the belief that the ideal, or something approaching it in many properties—something that would take the place of metal—might be found in some sufficient modification of paper pulp (not meaning wood pulp so generally used now to make paper). He enumerated many qualities in that substance that were desirable in an ideal material, provided inventive genius could overcome the objectionable features of the pulp as we found it. He noted the possibilities of the introduction of some substance which, together with pressure, would render the material hard enough to be durable as a filling and be impervious to water or the fluids of the mouth. It could be produced absolutely white and susceptible to any degree of coloring or shading. Nothing better could be desired as a non-conductor to thermal changes, and non-irritant to tooth sensitiveness. Ease of manipulation and perfect adaptation to walls of the cavity were considered. He hoped someone would

experiment along that line. He spoke of cellulose or celluloid as a paper pulp chemically treated to show the density secured by that process. If celluloid could be introduced into a tooth by some practicable means soft enough to be adapted closely to walls to become hard and unchangeable in a reasonable time, there was something pretty closely approaching the ideal.

I am not writing to exploit anyone's scheme, nor to advocate something I know little about, but I have seen recently some work in celluloid that seems to me worthy of the serious attention of dentists who are looking for something better than we have got, for at least some conditions we find that tax our skill and ingenuity to overcome. Many of the dentists of this city have seen the celluliod fillings which have been put in by Dr. Phillip A. Palmer of Chicago, in teeth out of the mouth; or in the mouth by some clinical operators showing his method. Lack of perfection in the process, and lack of knowledge and experience to know how to handle the substance to get good results were both responsible for the unfavorable opinion that fell to its lot at that time. Dr. Palmer is 72 years old, but has the persistency of youth or middle age in trying to solve the problem of celluloid fillings, and has brought his process much nearer perfection in the last few weeks. That he has reached the goal I cannot say, but there seems to me to be a plausible probability that either Dr. Palmer or someone else who may take up the work of experimenting along that line may succeed in adding eventually a valuable material to our list of materials to be used in the repair of decayed teeth. There is one feature at least, of this celluloid process, that may prove a desideratum long felt, if the fillings per se are not practicable, and that is *celluloid enameling.*

How often we find teeth—anterior teeth especially—imperfectly enameled, discolored or decayed, or suffering from all these defects, to a seriously disparaging extent, which we are called upon to repair without cutting off and crowning. I have seen such a tooth restored in contour with oxy-phosphate cement, and then enameled all over the exposed portion of the tooth, fillings, tooth substance and all, with a celluloid enamel of a shade and brilliancy approximating a natural tooth that would defy detection by a dentist without a most close and exacting observation, let alone the less-observing public. The restored tooth was as natural as life. Secretions of the mouth cannot affect it. Wear and tear may dull or disfigure it in time, but it is quite susceptible to repair as good as new whenever required. Remembering the

wisdom of Dr. Cushing and his thought about paper pulp or celluloid, should we not seriously look into the possibilities of this material becoming a factor in our methods of tooth repair, if not an ideal substance for artificial restoration in cavities of decay?

R. B. T.

ETHICS.

BY T. ELHANAN POWELL, D. D. S., CHICAGO, ILL.

Ethics! What is Ethics but right living?

Well, it seems to me that I should have a half-dozen books on Ethics. Each society of which I have become a member has required that I subscribe to a code of Ethics; each one being a model for its kind, but keeping strictly within its own little field without so much as a slight "How d'e do" to anything outside.

In the study of Moral Philosophy, after wading through several hours of beautiful sounding phrases and idealistic rules, it would seem unnecessary that anything further be said for the guidance of man on earth or in heaven.

"Ethics of the Dust" were the words spelled out on the title page of a book written by an estimable English gentleman, whose writings, by the way, have done much to uplift struggling humanity.

In this book we find a very comprehensive treatment of a beautiful ideal, embodying the Golden Rule with special reference to practical life.

I'm not an enthusiastic believer in creeds and codes. They serve us as do the sails when wind and weather are favorable, but when the storm gathers we furl the sail and invoke the aid of a more powerful agency.

It matters little whether we subscribe to creeds or codes, for there are certain unchangeable duties from which one can never get away.

First among these is Duty to Self. Duty to Self comprehends all the rest, but for the sake of clearness of thought we shall speak of it as a division of the whole.

Comprising duty to self, let us enumerate five points:

Physical Soundness.

Practical Mentality.

Mental Culture.

Spiritual Culture.

A Discerning Humanitarianism.

The time was when a treatise on Physical Culture would have received to itself attention in an inverse ratio to its importance. But now the periodicals are filled with advertisements of the numerous systems of Physical Culture, showing that appreciation by the reading public of the importance of a sound physique.

Practical Mentality, resting upon the firm foundation of a sound physique, is the framework for the grand superstructure which the Great Architect designed man to be.

By constant application of the mind to those things which broaden and deepen its scope, can practical mentality be obtained. Such application should begin in youth; but, should circumstances delay the beginning, much may be done in later life.

Mental Culture and Spiritual Culture presuppose the acquirement of Practical Mentality. The first may be gained in the perusal of the best literature, the study of art, and by travel. While traveling is a luxury enjoyed by a few, good literature and some knowledge of art are accessible to all.

Spiritual Culture, recognized and appreciated only by those that acquire it, is of paramount importance, and is absolutely indespensable to a Discerning Humanitarianism.

What symmetrical beauty stands forth in the life of one possessed of a keen appreciation of the meaning of Duty to Self!

The man who realizes to the deepest extent his duty to self is the one most strongly impelled to perform his duty to others. Such a nature will never shrink from responsibilities, but will rather seek continually a broader field of usefulness.

Family life is a natural condition, and he expects its cares with its joys. He permits neither adversity nor prosperity to disturb his equanimity; he bears them both with grace and dignity.

The same innate sense of kindness and justice will manifest itself in the treatment of his patients and his professional brethren.

To him who approximates this ideal life, a code of ethics cannot be a restraint; he prizes them only in proportion to the degree of helpfulness and strength obtainable from them by himself and his fellow practitioners.

"Make one like what you do, and he will be like you."

Why not embody this in our codes? Will not the Law of Love work here as well as elsewhere?

GENERAL ANESTHESIA.

Lecture Delivered Before the Senior Class at the Chicago College of Dental Surgery, April 2, 1902.

BY CASSIUS C. ROGERS, A. B., M. D., CHICAGO.

The diseases which would indicate caution or the complete absence of an anesthetic are:

(1) *Widespread atheroma* of the arteries. By atheroma of the arteries we mean a hardening of the coats of the arteries, due to the deposition of some salt. We find this condition of the arteries in old age, and in younger individuals, due to syphilis, alcoholism, and rheumatism. Anesthetics are frequently given to old people, i. e., people past middle life, 60 or 70 years cf age. An anesthetic is given because it is absolutely necessary to do this in order to perform certain work where the shock of pain would do greater harm to the individual than the taking of an anesthetic. Every individual that takes an anesthetic, young or old, runs a certain risk, but a person with atheromatous arteries runs a greater risk. There is one peculiar fact in regard to giving anesthetics to old people, and that is that they very seldom die under the anesthetic. Younger individuals more often die under an anesthetic than do the old people. The danger period for old people is in the after effects; the system is not in the condition that it was in youth; katabolism is predominating over anabolism, and the person is feeble, as we say. Consequently they stand the immediate toxic effect of the anesthetic, but, owing to the after effects, due to the condition of the system, we often have death following several days after the administration of the anesthetic.

Selection of anesthetic.—What anesthesia should be given in these conditions? In atheroma, with weak heart, we give ether; in atheroma, with renal diseases, we give chloroform. Therefore it depends on the condition of the patient.

(2) *Certain heart lesions,* when present, should always make us cautious about giving anesthesia. First, we listen to the sound of the heart. The loudness or softness of the sounds of the heart, you know by this time, do not mean much. We may have a perfectly normal heart and have a loud sound, depending on the thickness of the chest wall, the nervous condition of the patient, and so on.

(3) *In aneurism* you would not give a general anesthetic without very grave symptoms requiring such to be the case. *In*

obstructions of the trachea, the larynx, or the bronchial tubes. In all those cases an anesthetic is contraindicated.

(4) *In diseases of the lungs,* where it is impossible for the patient to assume a recumbent position, an anesthetic should never be given unless it is absolutely necessary. In bronchitis, in asthma, in heart lesions, where the individual is compelled to sit in a semi-erect position the entire twenty-four hours of the day, unless death is imminent, do not give an anesthetic of any kind. This is speaking in broad terms of all anesthetics, both *general and local.* Chloroform is dangerous to these individuals. Ether is the safest anesthetic that you can give, if you *must* give an anesthetic, but never give chloroform to a person who is compelled to remain in a semi-erect or in the erect position. Always give chloroform with the patient in the horizontal positiin.

(5) *In emphysema,* with weakness of the right heart, you would not give a general anesthetic. As you know, the blood goes from the right heart to the lungs. In emphysema we have a large chest, with large air spaces, and there is a tendency for the blood to be hindered from going from the right heart to the lungs. If the heart is compensated in this condition, and we have a very strong, thick-walled heart, then sometimes we can advise an anesthetic without any great amount of apprehension.

(6) *In chronic bronchitis* ether should not be given. Chloroform should be given in that condition.

(7) *In advanced pulmonary tuberculosis,* where we have an abscess forming, or where we have a great many of the alveoli filled up with fluid or pus which will be expectorated, and only part of the lung is functionating at best, to give anything in the way of an anesthetic which would have any tendency to congest the lungs would simply throw that many more alveoli out of use; there would be less function of the lungs, consequently a greater danger to the individual. Therefore chloroform is recommended in those conditions. I will tell you the reason for this when we take up chloroform and ether by themselves.

Preparation of Patients for Anesthesia.—Before giving a general anesthetic of any kind, especially chloroform or ether, the patient must be prepared for an anesthetic, and this preparation we must begin twenty-four hours before the anesthetic is to be given, unless it is an emergency operation. By an emergency operation we mean one that must be performed immediately, or as soon as is possible, to save the life of the patient—cases such

as appendicitis, fractured bones, accidents on the railroad, amputation of limbs due to crushing, etc., where the shock induced by letting the patient go without the operation or removal of the diseased organ would produce death, while the removal of the organ will in all probability save the life of the patient; then we advise an anesthetic, and the anesthetic to be given is the one which the condition of the patient will indicate.

Barring emergency operations, all patients should first be dieted, their diet being restricted to certain articles. Do not diet a patient for three or four days, because this means a certain amount of weakness to the patient, and that simply adds to the gravity of administering an anesthetic. A patient, however, should be given a light diet, beginning twenty-four hours before the operation. He should be given brisk cathartics, e. g., a quarter of a grain of calomel every half hour, until twelve doses are given. About three hours after the last dose of calomel is given an ounce of magnesium sulphate should be given, and in a few hours there will be a good bowel movement, or several of them. Then, by givng a rectal enema you will clean out the bowels, when the patient will be in no condition to absorb toxins from the alimentary tract, and this also lessens the amount of nausea which the individual will have in taking the anesthetic and afterwards. Thus the bowels are taken care of.

Examination.—If the patient is under your observation long enough, get a twenty-four hours' specimen of urine and determine how much urine the patient is passing in twenty-four hours. If this cannot be done, take a morning specimen of urine and examine that. Always have a microscopic and chemical analysis of the urine before you give an anesthetic, except in an emergency case. In this examination of the urine, examine for albumen, for sugar, for pus, for bile, for casts, epithelial scales, and uric acid and urea crystals. This examination can be made in a few minutes if you have the microscope and instruments at hand for such work. After the kidneys and the urine are examined, a careful examination of the patient should be made. First, get the history and symptoms of the case, if it is one that you have not seen frequently, and hence are not familiar with the symptoms and the disease. Make a history of this. You may have it in your mind; but, supposing the patient dies under the anesthesia and the relatives conclude after a year's time to make trouble about this, you perhaps have had a great many cases on

your mind in the meantime, and you have forgotten a great deal. If you have a history of the case on a history sheet, written down and your names signed to it, and the patient's name at the head of it, then all you have to do is to go back and refer to this case, and it brings all of it back to your mind.

In examination of the patient, note the liver, its size, whether there is pain on percussion, and so on; the condition of the abdomen, whether distended or not, whether it contains fluid, and so on.

The most important organ, however, after the kidneys, is the heart. Examine the chest thoroughly, examine for the heart lesions. You all know by this time that there are four places on the chest where we can hear pathological murmurs more distinctly than any place else. Listen at those points, and if there is a pathological sound, simply note the time of the sound in relation to diastole or systele, and the direction in which the sound is transmitted, in case it is transmitted, and you can tell which valve is affected. We have sounds of the heart not caused by the valves—friction sounds, due to an old pericarditis or adhesions from pleurisy or from tuberculosis, etc., of which we have spoken in previous lectures. Those conditions must be taken into consideration in determining the size of the heart and listening to the pathological sounds. Then listen to the respiratory sounds and find if there are murmurs. If there are, find out whether they are moist or dry rales, and, if possible, find out whether they are due to a chronic or acute condition. Never give an anesthetic where there is an acute inflammatory condition of the bronchial tubes, because your anesthetic will simply add to the inflammatory condition and may cause a pneumonia following a few days after the administration of the anesthetic.

Preparation of Patient for Operation.—The patient should be given a bath, then the part to be operated on should next be considered. The night before the operation the part should be thoroughly scrubbed, unless it is about the face. If the operation is to be in the mouth, you will simply have to do the best you can, the mouth being very hard to disinfect. The part must be scrubbed with green soap and water, and, after that is done, washed with alcohol, ether and bichlorid; then place on it a wet dressing, with bichlorid or boric acid, to keep the part moist. This should remain in place until the time of the operation. After the anesthetic is given the dressing should be removed and the patient thoroughly scrubbed again with green soap and water

and the different solutions, alcohol, bichlorid and ether again applied to the parts, so as to get the region as near sterile as possible.

In giving an anesthetic, either ether or chloroform, the first thing is for the comfort of the patient. A patient always has a certain fear or a certain discomfort at the time of taking an anesthetic and a certain dread. You can sometimes scare an individual to death at this time very easily. Never allow a patient to be told just before an operation how many people have died under an operation. If it is a private home, keep all the relatives and friends with faces a foot and a half long at this time out of the room. Do not let them come in and tell how Mrs. A. had a slight operation and she died, and B had an operation and he died, and now "you" are going to have an operation and perhaps will die; and they will remain about three hours when they should have stayed about two minutes, or should not have been there at all, and a few visitors like this one that I have just mentioned will get your patient in a condition in a few hours so that you cannot get his confidence in three weeks. The laity have a tendency to believe stories that are told them, and you know how stories travel, not only among the laity, but among the professional men and women, and a little always added to it—there is never anything detracted from a story of that kind. Therefore when you are going to give an anesthetic, do not allow any one to talk to the patient about the danger of the anesthesia. Get the confidence of the patient, and when you start to put him to sleep, tell him a story or do something to get him in a good humor—let him go to sleep with a smile on his face rather than with an indication that he is going to see Dante's "Inferno"; when a person is just going to sleep, he will have hallucinations, dreams as we call them, and if he has something pleasant on his mind you can see him smile as you give him the anesthetic, or a pleasant, peaceful expression come over the face, while if he has the fear of death before him, you will see just the opposite, and when he awakes he will tell you that something terrible seemed to happen just before he went to sleep, dreams and thoughts of death, etc. There may be a little hypnotism or magnetism in this; if so, that is all right; get the confidence of your patient, having him in a jovial rather than in a gloomy mood. After this is done, tell him that he is simply going to sleep, that that is all there is to an anesthetic; remind him that normally he is, or should be, unconscious about eight hours out of the twenty-four,

which takes away a great deal of this fear, because under an anesthetic people lose consciousness just the same as when they go to sleep. However, in normal sleep the toxins which put them to sleep under an anesthetic are not present; there is simply a tiredness, the neurons need rest and recuperation. Soon after this is done, then, if you are going to give ether, be careful how you give it. Ether has a tendency to irritate mucous membranes. Ether is cold, hold it a foot or a foot and a half from a part and spray it, it will freeze the part and turn it white, and it will do the same to mucous membranes. Therefore if you were to crowd the ether at the beginning, it would be very disagreeable to the patient; it is cold to begin with, then it causes a hyperemia of the mucous membrane and a great deal of mucous will be thrown out which will cause trouble in using the anesthetic.

Administration of Ether.—First moisten the parts with a little oil—the lips, the eyelids, and the alae of the nose—which will make the patient more comfortable. Place the patient on his back with a slight elevation of the shoulders or the head, using a pillow if desired; let the head be thrown slightly backward, if anything, so that the trachea will be open at the hyoid bone and the larynx moved up so that the epiglottis is thrown up and the tongue will not drop back into the pharynx and strangle the patient.

Before starting the anesthetic, always see that there is not a foreign body in the mouth—a plate, artificial teeth that are liable to become loose and drop down into the trachea, that there is absolutely nothing in the mouth in the way of a foreign body that can drop down into the larynx. Individuals often come into the anesthetizing-room chewing gum; see that this is taken out of the mouth. Everything that can be removed from the mouth which might have any tendency to cause asphyxia should be removed. The only things left that will cause any danger are the soft palate and the tongue, and the tongue can be seized with a tongue-forceps and brought upward and outward; never bring it past the teeth, bring it into the roof of the mouth; that gives a large pharynx through which air can pass, and in that way the soft palate will be relieved and the person is free from these dangers.

A good way to give ether, as you may know, is to take a wire mask similar to that used in giving chloroform, i. e., two or three layers of gauze, place a little cotton between them, then another layer or two of gauze on top, and drop the ether on

this as you would do in giving chloroform. This is at the beginning, in that way the mucous membrane and the skin becoming accustomed to the ether, simply by having a little of the fumes come in contact with it. After a few minutes you can apply more ether, and in that way avoid all the discomfort of the irritation to the mucous membrane. Then take your ether cone, place a little ether upon it, and hold it over the face, but in doing this do not place it right down over the nose so that the individual cannot get air; the idea that a patient should not get any air when ether is being administered is wrong—these patients should get air, they *must* get air; if they do not get it they are in danger of asphyxia. The discoloration of a patient when taking ether is because he is not getting sufficient oxygen. Lift the mask and allow the patient to get some oxygen, letting the hemoglobin of the blood become charged with it, and the pulse will come back to normal and the stage of excitement will be greatly relieved. Take a person in an unconscious or semi-conscious condition and place an ether mask down over the face in such a way as to strangle him, it will cause an excitement just the same as though some one were choking him. If somebody were choking you or there was some obstruction present so that you could not get air, you would fight; therefore you cannot blame these people for fighting when an anesthetic is pushed too rapidly. Let the patient get enough air to keep the color normal and to keep the respirations practically normal and the heart in as good a condition as possible, then by adding a little more ether, a little more ether, and so on, you get the patient over the first stage, which is the stage of consciousness. We have three stages in ether anesthesia:

(1) The stage of consciousness; (2) a stage in which we have a loss of consciousness, but not a loss of reflex; (3) a stage in which we have the loss of reflex.

Then again, the *first* stage is divided into three stages:

(*a*) The beginning stage, or stage of irritation, which I have told you how to prevent; (*b*) the stage of quietude, in which the patient lies quietly and breathes along very naturally if the anesthetic has been started in the right way; and, (*c*) the stage of intoxication, in which the patient becomes practically delirious just the same as though intoxicated by alcohol—he is drunk as it were; he is semi-conscious, able to talk, able to fight, and these individuals use all the muscular effort they have, and sometimes, if you do not know how to give the anesthetic, it will take four

or five individuals to hold them down. Do not do that, it is barbarous to administer an anesthetic to an individual and have about four men pile on top of him and hold him down while the other man gives the anesthetic. Simply remove the mask from the face and let him come out a little from under the anesthetic; tell him he is all right, instruct him to expire, throwing out all the air in his lungs; if you were to tell him to breathe deep, he would simply hold his breath; therefore tell him to throw all the air out of his lungs he can get out, and you know air must come back, consequently he will have a deep, full inspiration. You will be surprised, under these circumstances, how these patients will throw the air out of the lungs, and as they must be filled, it will come back in, but be careful that the patient does not draw in a large quantity of ether and paralyze himself. Therefore if you give the ether cautiously and take your time for it, you generally can get these individuals to sleep without very much trouble. Of course, there are certain individuals who will have a marked stage of excitement, and in these cases it is necessary to have some one hold them under control; but if you keep the patient's head under your control he cannot get away from you. Keep the mouth closed, thus compelling him to breathe through the nose, doing this by placing the little finger and the ring finger under the angle of the jaw, pulling the jaw upward and forward; in that way you keep the mouth closed, the hyoid bone thrown out, and the back of the tongue up, so that there is a great big pharynx for the air to go through the nose and down into the trachea. While doing that you can hold the ether-cone over the face with the index finger and the thumb, keeping the head on the table, and if in giving a man an anesthetic you keep his head on the table he cannot get away from you; but let him get up once, and he is so strong that you can do very little with him. Therefore I say that in giving an anesthetic, you must watch this one point—to keep the head on the table; then all the other individuals have to do is to keep him on his back with the hips square, and he cannot fight very much, and all that is left to do is to keep his hands from drawing away the ether mask. If he kicks, let him kick—it is better for him to do that than to struggle, because when these individuals fight there is a congestion of the veins, they become blue, the blood is thrown out of the heart—any one who is straining hard or wrestling has a congestion of the veins; then after the relaxation comes the lungs are charged with impure blood, they take in a deep inspiration, and if the

ether is right at the nostrils it is carried to the blood, the blood passes to the heart and paralyzes it. So if you have a stage of excitement, when the person takes a deep inspiration lift the mask a little so that he can get a little oxygen, do not charge his lungs with almost pure ether instead of air; let him get a certain amount of air and at the same time a certain amount of ether. This stage of excitement can be prevented a great deal, if, after you have passed over the first stage (i.e., the stage of irritation), you will push your anesthetic; while the patient is lying quietly with the eyes closed as if asleep, and just before the stage of excitement is on, push the ether, that is, give a great deal; the patient is breathing normally, he will not get too much, it charges the blood with ether, and when the stage of excitement comes on it simply throws him into the semi-conscious condition, i.e., the loss of the fighting stage and of consciousness. Therefore the stage of excitement can, in most individuals and under good anesthesia, be made very short, it need be only a few minutes long; whereas if you give the anesthetic slowly through the stage of quietude, dribbing it along, it will take the individual fifteen minutes or half an hour to get through the stage of excitement, then he is tired out before you get him under the general anesthetic.

After the patient has passed this stage of excitement there is loss of consciousness, but the reflexes are still present; i.e., if you were to stick him with a pin he would respond. The best way to tell whether the reflex is lost or not is for the anesthetizer to raise the upper eyelid; if it contracts to close the eye, you know the reflex is not lost. If you lift the eyelid and touch the cornea with the finger, causing iritation, and the eye closes, the reflex is not lost.

If you wish to set a dislocation, as a dislocation of the jaw, or a double fracture of the jaw, it being fractured in two or three places, or a compound fracture, the end of the bone having broken the skin, this is the stage in which to do your work—you do not need to get the patient any farther under the anesthetic than this; you can reduce a dislocation, set a fractured limb or bone, better in this condition than in any other. In breaking up ankylosis, as of the joints when they are stiffened due to a tubercular, to a rheumatic, or to a hyperemic condition, with a partial ankylosis, this is the stage in which to operate, not waiting for complete anesthesia. But if you have to do any cutting, especially

where there are important vessels, the reflexes are not lost, the muscles are contracted, the vessels are distorted and a little out of their usual path, and in that stage they might be injured; therefore let the patient go past this stage until the loss of the reflexes.

There are certain reflexes which are never lost, and these are what are called the deep reflexes. The heart beat is a reflex, the irritation going up to the brain; the pupil of the eye does not lose its reflex in these three stages of ether anesthesia. Therefore if the anesthetizer watches the pupil of the eye and touches the cornea, he knows when the second stage is past; then he simply notifies the operator that the time has come when he can begin his work. Then all that is necessary from this time on is to give enough ether to keep the individual in this condition—it is not necessary to push it any longer; a few drops of ether from time to time will keep the individual in this condition. Pain has a tendency to act as an antidote to these conditions, so if it is a laparotimy to get to the intestines, the patient must be deeper asleep when the surgeon gets down into that region than if it were a superficial wound, because the reflexes which are set up by the deeper incisions are more marked than they would be if it were a superficial operation. But after you once get the patient to sleep, it depends on the operation as to how much ether you give; therefore watch the operator and watch the patient. Every anesthetizer should know what operation is going to be performed, and it is just about as important for him to know the next step in the operation as it is for the surgeon so that he may manage his anesthetic accordingly; when the surgeon has to do a certain amount of dissecting, and so on, and there is practically no pain, the anesthetic causes considerable pain, a little ether must be pushed so that when this work is done the patient will still be asleep, then take away the ether and let the patient come partially out, as we say, i.e., keep the ether away from him; you can watch the pupil, and, if you are accustomed to this work, just keep your patient under the anesthetic sufficiently so that after he has entered the third stage he will be kept in such a condition that there will practically be no danger.

The Pupil in Ether Anesthesia.—In regard to the pupil in giving anesthesia with ether, first we have a contraction of the pupil; it will contract until it is about the size of a common pinhead, then in the second stage it comes back to its normal appearance, and in the third stage it dilates somewhat so that it is about

half its maximum dilatation. When the pupil gets in that condition it should remain there—never allow it to contract, as this shows that the patient is coming out from under the anesthetic. If it dilates rapidly, covering nearly the whole of the iris, then he has too much of the anesthetic, and it indicates as dangerous a condition as the small pupil. Therefore, watch the dilatation of the pupil, never allowing the pupil to lose the reflex to light, for this indicates a serious condition; if upon lifting the eyelid you find the pupil dilated and it does not contract to light, the anesthetic must be removed, and removed at once, and stay removed until the pupil will again reflexly contract to light; no matter how far he has to come out from under the anesthetic, if clear out into the semi-conscious stage, it must be done, because the nervous system is dead so far as reflexes are concerned, and the patient is in a serious condition.

The Heart and Respiration.—In ether we have a cardiac stimulant, therefore in ether anesthesia we have the heart beating faster at the beginning, and then, as the patient is brought under the anesthetic, it gradually slows down to its normal condition, and a good anesthetizer will find that the pulse is probably about 85, just about normal; the pupil of the eye is just a little more dilated than normally, and the respirations are normal. The character of the pulse—its force, frequency, regularity, etc.—must be watched; this you can tell from the coronary artery or the facial artery. The respirations must be watched, because a great many times the respiratory center in ether anesthesia is paralyzed first; therefore we watch the respiration, and that you cannot do by watching the movements of the chest or the movements of the abdomen of the patient, because in these individuals the muscles of the thorax and so on will cause a movement of the abdomen and of the chest just as if they were breathing along normally, but when you place your hand over the nostrils you will find that they are not throwing any air out or taking any in, so you cannot go by the appearance of the chest. It is a very good plan to place the hand over the nostrils as stated, because in so doing, every time there is an expiration you can feel the air, in which case you know that the patient is taking an inspiration followed by expiration. Therefore always know, either by hearing the patient breathe or by placing the hand over the nostrils,

that he is breathing normally. You can go farther than that; place a mirror over the mouth in case of doubt, and if the patient is breathing you will see the vapor settle on the mirror. That, of course, would be in cases where it was a question whether the patient was breathing at all or whether he had succumbed to the anesthetic.

Nausea, Etc.—With ether we have a certain amount of nausea and vomiting following its administration, and also in the stage of excitement we have a mucous forming, and this mucous must be kept out of the pharynx, for if by inspiration it is taken into the lungs, it will infect them and the patient a few days afterwards will come down with pneumonia; a great many individuals die from pnuemonia after taking ether, not due to the irritation of the ether, but to the mucous which the anesthetizer has allowed the patient to inhale into the lungs, in that way the alveoli of the lungs becoming infected and the pneumonia for that reason being set up. Very few cases of pneumonia are started by the irritation of the ether, unless it has been a very unskilful anesthesia; it is the foreign matter—the mucous, the vomited contents thrown up into the pharynx and allowed to be inhaled into the lungs—which causes infection of the lungs and the resulting pneumonia. A certain number of these cases will happen with the best anesthetizers. Some people have a tendency towards regurgitation, but this can be prevented to a great extent if the stomach is washed out before the administration of the anesthetic is begun and if no food is taken for several hours before. You can prevent this by lowering the head somewhat and turning it to one side, so that when the stomach contents come up into the pharynx they will pass into the buccal cavity and can be swabbed out with a sponge. Never go way down into the pharynx, as I have seen some do, with an artery forceps six inches long to get the mucous up; turn the head as described and wash the contents out from the buccal cavity, and you will not set up an acute pharyngitis due to the condition of the sponge, and neither will you have very many cases of pneumonia if you follow this plan.

Then again, in giving ether, prevent if possible the after-effects of vomiting which sometimes is very profuse. The individuals vomit and wrench, and this does them a great deal of harm, causing congestion of the veins and sometimes producing

death due to rupture if the walls are weak. You can prevent this by having the alimentary tract free, and also if you give the patient a little vinegar and water after he comes out from the anesthetic; give him simply that, keep all other fluids out of the stomach, or sometimes a small hypodermic of morphine will stop this condition; again, a few fumes of ether will have a tendency to stop the irritation; pulling the tongue forward is another remedy which will stop this vomiting.

AMERICANS DOCTOR ROYALTY.

KINGS, QUEENS AND NOBILITY OF EUROPE EMPLOY AMERICAN DENTISTS.

London, Sept. 5.—"American dentists are employed by nearly all the crowned heads of Europe," said Dr. Allison W. Harlan of Chicago, who sails for the United States to-morrow after having taken a prominent part in the proceedings of the international dental congress held in Stockholm, Sweden. "By far the most striking feature of the meetings," he continued, "was the revelation that American dental surgeons are practicing in nearly all the royal palaces of Europe.

"Kaiser Wilhelm of Germany and the empress of Germany, the czar, the queen of England, Queen Wilhelmina of Holland, who empoys Dr. James Stewart, a Chicagoan; Dowager Queen Margherita of Italy, the king of the Belgians, King Oscar of Sweden and Norway, a host of petty royalties and most of the nobility throughout England and the continent decline to allow any but American dentists to touch their teeth. The czar sends all the way to Dresden when he requires a dentist in order to have the advantage of the services of his favorite American practitioner. In those rare cases where the royal dentists are not Americans they are men who have learned their profession in American colleges.

"In the course of the deliberations of the congress little doubt was left that Europeans regard the United States school of dentistry as the most advanced in the world. It was voted enthusiastically to hold the next congress at St. Louis when the exposition is in full swing. Dr. Brophy of Chicago, who has been re-elected president of the International Dental federation, closed the congress with one of his celebrated palatal operations."

Editorial...

DECISION ADVERSE TO THE GERMAN-AMERICAN DENTAL COLLEGE.

In our last issue we stated that Judge Chettam would render his decision in the G. A. D. C. mandamus suit on August 1st. On account of the length of the decision (which we print in full in this issue) it was not rendered by the able Judge until the 9th of August, but when it did come—my! what an awful thud—especially to the North side.

This decision was nothing more than what was predicted in our last issue, and which was expected by those who heard the evidence. The decision on being read will show that Judge Chetlain went over every part of the testimony and weighed it carefully.

In the language of the able Judge, the questions for the court to determine were:

First. Did the Board investigate, hear and determine the question as to whether the German-American Dental College was a reputable college? *Second.* Did it act upon proper and sufficient evidence? *Third.* Did the Board fraudulently, or without reasonable cause, arbitrarily or maliciously, or with intent to injure the German-American Dental College, refuse to issue a license to relator?

On the first question it was shown that the Board did try to determine the qualifications of the G. A. D. C., and so far as they were able to discover, there was little to class this as a reputable college. The evidence during the trial proved beyond a doubt that the conclusions of the Board were correct. It was shown by the testimony of Dr. Huxmann himself that no financial records were kept of students in attendance. The Professor of Anatomy testified that he received fifteen dollars per month for giving his lectures. According to the testimony of several teachers of the G. A. D. C., their incompetency was clearly shown.

One section of the decision of the jurist in reviewing the case, calls for consideration from some of our dental schools.

classed as reputable. We quote verbatim. "But there are other matters equally if not more important, which the Board may consider, such as the failure of a college to observe its own rules and public requirements; whether it is a mere commercial enterprise and graduates students for money, without reference to scholarship, or seeks by money or other disreputable means to *secure recognition or licenses for its students* from the State Board, or is otherwise guilty of conduct which in the ordinary sense of the word is not "reputable."

Some of our best colleges would, no doubt, strictly speaking, fall under the ban of being a commercial institution, and also, by following such practices, conflict with Rule XXXV as passed by the Board, and held in this decision, to be strictly within their province to pass and enforce. Many of our better institutions have been in the habit of conditioning graduates; that is, having listed the party as a graduate, and who to all intents and purposes, in the eyes of the public, is a graduate (only that he is not) for the reason that he is deficient in points in operating or on time, etc., and his diploma is given in blank on day of graduation, and when these delinquencies are met the diploma is properly filled and delivered to the party. This, although being bad practice, is not quite so bad as members of the faculty going to members of the State Board and asking the Board to issue a license to this conditioned graduate on a diploma which he does not have, when this act would be directly in conflict with Rule XXXVII, which states that "No license will be issued to any candidate *except after examination* by the Board at a regular meeting, *except* when issued upon a *diploma* granted by the faculty of a reputable dental college." Colleges, supposed to be reputable, asking a Board to break its own rules! As we have previously stated, we now have a Board which cannot be influenced in the least, and colleges which wish to see the ban raised from the profession in Illinois should lend their influence to see that the rules are obeyed by themselves as well as by questionable institutions. The labors have just begun to bear fruit; let no stone go unturned until *all* guilty ones have been brought to justice.

THE FOURTH INTERNATIONAL DENTAL CONGRESS.

At the meeting of the National Dental Association at Niagara Falls, July 28th to 31st, a committee, consisting of Drs.

Eugene H. Smith, Boston; Truman W. Brophy, Chicago, and W. C. Barrett, Buffalo, was appointed as special envoys to the Federation meeting in Stockholm, Sweden, August 15th, to ask the committeee having in charge the promoting of the Fourth International Dental Congress of the Federation Dentaire Internationale to hold said dental congress at St. Louis during the Louisiana Purchase Exposition.

On August 18th a cablegram was received from Dr. Truman W. Brophy, stating that the committee has accepted the invitation and that the Fourth International Dental Congress would be held at St. Louis in August, 1904.

In anticipation of the acceptance of this invitation Dr. J. A. Libbey, President of the National Dental Association, appointed an Executive Committee of fifteen, who are clothed with the power to organize and promote the congress. This committee is as follows:

EAST—Drs. Edw. C. Kirk, Philadelphia; R. H. Hofheinz, Rochester; H. J. Burkhart, Batavia; Wm. Carr, New York; Waldo E. Boardman, Boston.

SOUTH—V. E. Turner, Raleigh; J. Y. Crawford, Nashville; M. F. Finley, Washington; J. W. David, Corsicana, Texas; Wm. Crenshaw, Atlanta.

WEST—Don M. Gallie, Chicago; Geo. V. I. Brown, Milwaukee; A. H. Peck, Chicago; J. D. Patterson, Kansas City; Burton Lee Thorpe, St. Louis.

This committee will meet during October and organize with the view of setting the wheels in motion for the greatest dental meeting of the age. From the makeup of this committee we bespeak nothing but the greatest success in what they undertake. This can, and will be, made a great meeting, being held at a time and place where all can and will attend. With the two years now left for the preparation of this work nothing but the *best* and latest should be presented.

It is hoped this committee will "weed out" material which it is a waste of time to listen to on a cool, much less a warm day. We have some striking examples of what a political dental convention is in the National Dental Association. If more true search of knowledge was sought, no matter from what source it came, rather than playing a game of political college chess, much more good would be derived from the meetings, the attendance would be increased, the membership would be increased and

much more good done to humanity in general through the fruits of the dissemination of this knowledge.

At the last meeting of the N. D. A. the writer asked several of the younger men if they were going to join the association. They stated, "No! what do I care to join with the crowd of politicians for? The politics played here beats anything we have in ward politics in Chicago—papers crowded out which would be of the greatest interest to the profession, simply because the writer did not have the political pull to get his paper on the list." Cut out the superfluous, give nothing but the best, no matter from what school they may come; and if the committee feels a paper is not worth the time it would take for its presentation, "cut it out," no matter whose it may be.

PROPHYLACTIC ITEMS.

BY R. B. TULLER, D. D. S., CHICAGO.

Prophylaxis ought to be preached six days in the week.

Ought to be practiced seven days—several times a day.

And there's no breaking the Sabbath in that.

"Cleanliness is next to Godliness."

I can't give the exact book, chapter and verse in Scripture, but it is gospel truth.

You eat three meals a day—if you can get them.

Some people can't get so many. That's the curse of being poor.

Some people have four or five meals, regular, and often top off with a banquet late at night.

That's the curse of being rich.

I've known men, too, on ten a week, who go out after the theater and indulge in a "bottle and a bird"—with *her,* of course.

That's the curse of a champagne appetite with a *snit* income.

But what I'm getting at is this:

Use the tooth brush after each meal.

Of course no dentist neglects to.

But preach it to your patients.

Yes, brush after each meal, and one to grow on.

The one to grow on just before retiring. Why?

Because from that time on to breakfast the mouth will be free from food contaminations.

"Food contaminations" is good.

And, paradoxically, they are bad.

They are bad when left too long.

It takes several hours for food to ferment in the mouth.

Fermentation produces acid.

Acid attacks the teeth.

The attack is more or less interrupted during the day.'

So we have a proviso for lazy people:

If teeth are brushed but once a day, let it be at bedtime.

Or, at least, after the last meal.

O, yes, they may brush them in the morning, too.

The mouth will feel better, and breakfast will be enjoyed more.

It is a good practice, anyway.

There are *some* deleterious things going on over night.

Especially from overloaded stomachs.

And where food is not properly digested.

There are foul odors (gases) permeating the oral cavity.

They contaminate the viscid mucus that clings around the teeth.

It is a film quite insoluble in water.

This film holds acidity between itself and the teeth.

Rinsing with water, simply, will not dislodge it.

The brush and water will not do it effectually.

Hence, tooth powder is needed.

A proper powder will mix in with the film and break it up.

Soapy dentrifices are not the best. They leave a deleterious film.

They leave a bad taste, too.

The use of finely powdered pumice *once* a day (morning) is good. Rinse mouth well after.

Scratch the enamel? Bosh!

We dentists all use it when we clean teeth.

Our revolving brush or rubber point rubs a hundred times more than a brush in hand does.

A test has been made on teeth out of the mouth.

Six hundred revolutions a minute of a felt wheel charged with pumice has been run against a tooth for hours and days.

The wearing away of the tooth was practically *nil.*

However, there are better substances than pumice for general use.

A powder composed largely of prepared chalk is good; provided other ingredients are not injurious.

There are plenty of good formulæ. Can't name them here.

The brush and water alone does very well after each meal.

Use powder at night.

And especially in the morning.

A good practice at night is to use milk of magnesia *after* cleansing.

Rinse it about the mouth; work it between the teeth.

Don't try to wash away what adheres to teeth.

It is an ant-acid. It leaves a protecting film which remains some time.

Milk of magnesia is excellent to wash baby's teeth with.

Don't forget to tell mothers about that.

When the patient has done his best, he (or she) should visit the dentist frequently.

When nothing deleterious is in sight to the patient or any casual observer, the dentist can "dig up" a lot in most cases.

Not real estate, but calcific deposit. Serumnal calculus.

It hides more frequently than the average dentist realizes under the free margins of the gums.

It needs to be hunted out carefully with a proper instrument.

Let me emphasize *carefully.*

Carefully but surely find it, and remove it.

It is a most painstaking effort if properly done.

It is too often slighted by otherwise good and careful dentists.

And then what?

Incipient stages of what will later on be pronounced pyorrhea alveolaris;

Or some other more or less correct name for a pestiferous and tenacious disease, and equally shocking to patients.

It causes the loss of more teeth than caries.

No mistake about that.

And there must be a beginning somewhere, somehow.

Aren't you often largely to blame for it, Mr. Dentist?

Think it over.

Prophylactic items and suggestions are invited.

ITEMS....

Dr. C. Stoddard Smith, aged 61 years, died at Argle, Minn., August 30th.

Dr. R. H. Welsh, of New Orleans, La., spent a week in Chicago during August.

Dr. Harry P. Carlton, the new Dean of the dental department of the University of California, spent a few days in Chicago on his way to and from the National meeting at Niagara Falls in August.

Dr. W. P. Dickinson, Dean of the University of Minnesota dental department, spent a few days with Chicago friends in August.

Notices of Meetings

FIRST DISTRICT DENTAL SOCIETY OF ILLINOIS.

The Twentieth Annual Meeting of the First District Dental Society of Illinois will be held at Rock Island on September 23rd and 24th, 1902. Rates are being secured on the railroads and an interesting program is in progress. All are invited.

CLAUDE B. WARNER, Secretary.

MINNESOTA DENTAL ASSOCIATION.

The next annual meeting of the Minnesota State Dental Association will be held in St. Paul, September 1st, 2nd and 3rd. Fair week reduced railroad rates.

An intensely practical meeting, equivalent to a post-graduate course, has been arranged for by the officers in charge.

Special attention has been given to porcelain work and operative dentistry, and the meeting will be so replete with practical papers and demonstrations that no dentist in the city or country wishing to keep abreast of the times can afford to miss it.

Some of the best-known men in our state and from abroad will appear on the programme, which will be issued about August 15th. Anyone wishing to take part in the meeting will please address Dr. S. R. Holden, or Dr. J. M. Walls, at their earliest convenience. If you do not receive a program write Dr. J. M. Walls, and one will be immediately forwarded.

EXECUTIVE COMMITTEE.

SOUTHWESTERN IOWA DENTAL ASSOCIATION.

The Southwestern Iowa Dental Association meets at Clarinda, Ia., October 14th and 15th.

H. C. BARNHART, President. WILL J. MATHER, Secy.

NORTHERN INDIANA DENTAL SOCIETY.

The Northern Indiana Dental Society will hold its annual convention at South Bend, Indiana, September 24th and 25th. A good programme will be provided and a large attendance is anticipated. All are invited to come, also to participate in the meeting. M. A. PAYNE, D. D. S., Sec.

CENTRAL MICHIGAN DENTAL ASSOCIATION.

The semi-annual meeting if tre Central Michigan Dental Association will be held at Ionia, Mich., Octiber 1st and 2d next.

P. L. CAMPBELL, Sec.

VERMONT STATE BOARD OF DENTAL EXAMINERS.

A meeting of the Vermont State Board of Dental Examiners will be held at the Pavilion Hotel, Montpelier, Wednesday, October 8, 1902, at 2 p. m., for the examination of candidates to practice dentistry. The examination will be in writing, and will include anatomy, physiology, bacteriology, chemistry, metallurgy, pathology, therapeutics, surgery, materia medica, anesthesia, operative and prosthetic dentistry, and an operation in the mouth. Candidates must come prepared with instruments, rubber dam and gold. Applications, together with the fee of ten dollars, must be filed with the Secretary on or before October 1.

C. F. CHENEY, Secretary.
St. Johnsbury, Vt.

NORTHERN ILLINOIS DENTAL SOCIETY.

The Fifteenth Annual Meeting of the Northern Illinois Dental Society will be held at Rockford, October 15th and 16th, 1902.

Members of the profession are cordially invited.

J. J. Reed, Secretary.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The fifth annual meeting of the Southern California Dental Association will be held at Riverside, California, October 20th, 21st, 1902. An interesting programme has been prepared, and the profession in this and neighboring states is cordially invited to be present. L. E. Ford, Sec'y, Los Angeles.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Illinois State Board of Dental Examiners for the examination of applicants to practice dentistry in the State of Illinois will be held in Chicago on Friday and Saturday, October 17 and 18, 1902.

A recent opinion of the Attorney-General specifies the following as being eligible to take the examination before the Board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to removing into the State."

All applicants must come prepared with instruments, rubber dam and gold to perform practical work.

The examination fee is ten dollars. Any further information can be obtained by addressing the secretary.

J. G. Reid, D. D. S., Sec'y,
1006 Champlain Bldg., 126 State St.,
Chicago, Ill.

Original Contributions

THE INTERNATIONAL DENTAL FEDERATION.

BY A. W. HARLAN, M. D., D. D. S.

It may not be generally known what it is that constitutes the International Dental Federation. Those of your readers who are familiar with the trasactions of the Third International Dental Congress may remember that on the last day of that meeting, held in Paris, August, 1900, an executive committee or executive council of nine was appointed, whose duty it was to create an International Dental Federation. This was to be composed of various bodies. The first committee appointed by this executive council of nine was an International Educational Committee, and the second committee was one that undertook the study of Public dental service and State hygiene. In the year 1901 the International Dental Federation met in London and Cambridge, and, as your readers well know, accomplished a very satisfactory work. This year the executive council and the educational branch of the International Dental Federation met in Stockholm. One of the first things that was presented to the executive council was an invitation to hold the Fourth International Dental Congress in the city of St. Louis. This was presented by a commission composed of Truman W. Brophy, William C. Barrett and Eugene H. Smith. After due consideration and consultation with the representatives of the different countries present, the executive council decided to accept the invitation and designated August, 1904, as the time and St. Louis as the place for the Fourth International Dental Congress.

The following resolution was adopted: A committee of nine was asked for, to act as representatives of the executive council, to assist in the organization of the International Dental Congress, with full power to fill vacancies in said committee of nine, by death, resignation or disinclination to act. This committee is composed of Truman W. Brophy, Chicago; William C. Barrett, Buffalo; Eugene H. Smith, Boston; William Conrad, St. Louis; Gordon White, Nashville; H. A. Smith, Cincinnati; M. R. Windhorst, St. Louis; S. H. Guilford, Philadelphia, and J. D. Patterson, Kansas City, Mo. So it will be seen that this committee, composed

of representative men, acting with the committee of fifteen appointed by the National Dental Association at its late meeting held at Niagara Falls, July 28, will assure the success of the Fourth International Dental Congress. It should not be forgotten by your readers that the power to organize and carry on the Fourth International Dental Congress was deputed to the executive council of nine which was appointed on the last day of the Paris Congress. I will recall to the attention of your readers the names of the members of that council:

Charles Godon,	Paris.
E. Sauvez,	Paris.
John E. Grevers,	Amsterdam.
Elof Forberg,	Stockholm.
F. Hesse,	Leipsic.
Johann Franck,	Vienna.
George Cunningham,	Cambridge, England.
F. Aguilar,	Madrid,
A. W. Harlan,	Chicago.

So Much for the future of the Fourth International Dental Congress.

The Federation concerned itself this year in the consideration of three principal questions, the first being an effort to determine what should constitute the preliminary requirements for entrance upon dental study in dental schools. After the appointment of a committee, which considered the question for nearly two days, a definite conclusion was come to in about the following terms: In all those countries where medicine is taught and controlled by the State a similar standard of entrance will be required of dental students throughout the world. In those countries where the State does not undertake to educate physicians and dentists the equivalent to this standard will be required. It is well known that in France the bachelor of science degree admits to the study of medicine; that is also true in Spain. In Germany graduation from a *real schule* is the standard. In England the London University and the standard prescribed at Oxford and Cambridge is about equivalent to the bachelor of science degree in France and Spain. For the United States and other countries where the teaching of medicine is not undertaken by the State it was recommended that nothing less than graduation from a high school having a four years' course would be accepted as equivalent to the requirements in foreign countries.

A comimttee was appointed to determine what should constitute the medical and scientific standing of a dental student. That

committee reported and named eleven subjects that were considered a necessity in the teaching of the dental student. Those subjects comprise Anatomy, Physiology, Histology, Chemistry, Metallurgy, Bacteriology, Pathology, Materia Medica and Therapeutics, Surgery and Physics.

The third subject considered was the unification of the system of dental teaching. This, on account of the lack of time, was not fully considered, but the Federation adopted the principle of recommending that a universal system of teaching be indulged in throughout the world, so that a student might enter in New York, Chicago, London, Paris or Berlin and spend one year or two years, and if he desired to complete his course in some other country he would not be prevented from so doing and would not lose the time spent in any one of those cities or countries, but could go on and complete his studies in the country where his inclination or health might have led him to finish his course. This matter was referred for solution to a committee appointed to report at the next meeting of the Federation in Madrid in April, 1903.

This year, in addition to the meeting of the educational branch of the Federation, there was also convened a meeting of the international committee on hygiene and public dental service. This meeting convened Monday afternoon, August 18, and elected Dr. N. S. Jenkins, of Dresden, chiarman. The whole of the session was devoted to the consideration of a report that had been prepared by Dr. Johann Franck, George Cunningham and Elof Forberg on public dental service and the examination of the mouths of school children. This report has been published in a pamphlet which has been pretty generally distributed, and your readers may obtain a copy of it by addressing Dr. Franck, in Vienna, or Dr. George Cunningham, No. 2 King's Parade, Cambridge, England.

The educational branch of the International Dental Federation, at its closing meeting, re-elected Dr. T. W. Brophy as president of this branch, and elected Dr. Maurice Roy, of Paris, as the general secretary and Dr. Paul Guye and Theodore Frick, of Switzerland, as assistant secretaries.

The executive council re-elected Dr. Charles Godon as president and Dr. E. Sauvez as secretary-general.

The American Dental Society of Europe, at its last session, elected Dr. S. S. MacFarlane, of Frankfort-on-the-Main, president, and Dr. L. J. Mitchell, of London, secretary. The other officers your reporter did not get the names of, so they will have to go over. One thing quite noticeable was that nearly everyone remained during all the meetings.

We noticed among those present from the United States of America Drs. C. W. Strang, Bridgeport, Conn.; E. H. Smith, Boston; J. W. Wassall, Chicago; B. H. Smith, Baltimore; M. W. Foster, Baltimore; Gordon White, Nashville; W. A. Capon, Philadelphia; S. H. Guilford, Philadelphia; W. W. Walker, New York; E. A. Bogue, New York; T. W. Brophy, Chicago; W. C. Barrett, Buffalo; H. J. Goslee, Chicago; H. A. Smith, Cincinnati; A. W. Harlan, Chicago.

The meetings were all held in the Royal Caroline Institute and in the Grand Hotel.

THE FOURTH INTERNATIONAL DENTAL CONGRESS.

BY A. W. HARLAN, M. D., D. D. S.

After the invitation had been presented to the executive council of the International Dental Federation by the Commissioners, Drs. Brophy, Barrett and Smith, and it had been accepted, the following was adopted:

"The council specifies that Drs. T. W. Brophy, W. C. Barrett, E. H. Smith, William Conrad, Gordon White, H. A. Smith, M. R. Windhorst, S. H. Guilford and J. D. Patterson are appointed a committee to assist in the organization of the Fourth International Dental Congress as representatives of the executive council appointed by the Third International Dental Congress."

Just before the close of the last session the following was added to the above: "With powers to fill vacancies in the committee from any cause."

THE RECENT MEETINGS IN STOCKHOLM.

BY A. W. HARLAN, M. D., D. D. S.

It may not be generally known that the meeting of the American Dental Society of Europe in Stockholm was not the sole meeting held in that beautiful city, as there were gathered at the same time the advisory boards of the American dental colleges, the Swedish Dental Society and the International Dental Federation.

In giving an account of these meetings it is our object to show their importance to the dentists of the United States. We will begin first with the advisory boards, representatives of the different countries of Europe having authority to pass upon the credentials of dental students desiring to enter colleges in the United States. This was a representative gathering. We believe that members

were present from England, France, Switzerland, Germany, Sweden, Norway, Austria, Belgium, Holland and Italy.

The deliberations of this conference will shortly be published, but we may say in passing that more stringent rules for the entrance of students into American dental colleges were adopted, so that those having a low-grade education in foreign countries will not be able to avail themselves of the privileges of dental schools in America without having a standard of primary education equal to that possessed by our best American dental students. The meeting was most harmonious and all of the sessions were well attended.

The Swedish Dental Society was convened in Stockholm for the purpose of acting as host for the various societies and meetings that were to be held in Stockholm. Entertainments were provided by this society for the ladies who were in attendance as the wives, daughters, sweethearts and cousins of the American Dental Society of Europe and the International Dental Federation. Among the chief entertainers in Stockholm were the wife and daughter of Dr. Elof Forberg. Every day there was a luncheon or a visit to some castle, art gallery, museum, ride on the canals or a carriage drive.

The festivities began with a reception on the evening of Tuesday, August 12. Wednesday, August 13, President and Mrs. Royce gave a reception in the Grand Hotel. On Thursday there was a luncheon for all of the visitors, provided by the American Dental Society of Europe; in the evening a dinner at one of the resorts a few miles out of Stockholm. On Friday an all-day trip was arranged for the ladies. On the same evening was held a general banquet of the four societies convening in Stockholm. On Saturday there was a dinner at Hasselbacken. Sunday there was an excursion for all of the members and visitors to the Chateau Gripsholm. On Monday there was a luncheon given to all those present, ladies and gentlemen, by Dr. T. W. Brophy, of Chicago. Monday evening there was a banquet of the International Dental Federation.

The Swedish Dental Society confined itself mostly to giving clinics and among those who gave clinics were Dr. George Forssman; Dr. Ernst Levin, Dr. N. S. Jenkins, Prof. Dr. Hesse, Dr. Carl Sandstedt, Dr. Younger, Dr. Boedecker, Dr. A. Jessel, Dr. A. Korbitz, Dr. V. Haderup, Dr. W. A. Capon, Dr. Gordon White, Dr. W. S. Davenport, Dr. Mitchell and Dr. Paul Guye.

The American Dental Society of Europe held one of its most interesting meetings in Stockholm. The session was opened promptly

at 10:30 a. m., August 13, by the president, Dr. W. E. Royce. He delivered a most excellent address, the major portion of which was devoted to the consideration of the preliminary education necessary to begin the study of dentistry. This received careful attention, and when it is published in full will be considered as an epoch maker in the consideration of this question.

Dr. Royce was followed by Dr. A. Jessel with a carefully prepared paper on "Carbonized Cotton and Its Various Uses in Dental Practice." After a somewhat lengthy discussion by almost all of those present, Dr. B. Holly Smith, of Baltimore, read a most excellent paper on "The Status of Dentistry." This paper was discussed by Drs. William Mitchell, Jenkins, W. C. Barrett, T. W. Brophy, J. W. Wassall and others. In the afternoon three papers were read as follows: One by Dr. N. S. Jenkins, of Dresden, giving the latest phases in the development of porcelain enamel. Dr. Jenkins showed some decided improvements in the strength and denseness of his enamel, which was discussed in his paper. He also exhibited a patient having thirty-two fillings in his teeth, most of which had been in the mouth more than two years. Dr. Jenkins also exhibited specimens of recent improvements in his porcelain enamel.

Dr. J. W. Wassall, of Chicago, then read a paper on "Inlays versus Gold Fillings." This was illustrated by numerous specimens of inlays, all made with high fusing bodies. Dr. Wassall favors the use of impressions of cavities in making the matrix instead of burnishing platinum into the cavity.

Dr. Wassall in his paper stated that in a few years gold filling, except for certain limited cases, would be a thing of the past, and that the porcelain inlay or gold inlay would take its place.

Dr. Paul Guye then read a paper on "Porcelain Inlays, Using High Fusing Bodies." Dr. Guye's paper was historical and comprehensive, as it included all known methods of using high fusing bodies. It was illustrated by numerous specimens prepared by himself and his assistants before coming to the meeting. These three papers were then generally discussed during the whole afternoon by those who were present, including Dr. W. A. Capon, of Philadelphia; Dr. Goslee, Chicago; Dr. Hays, Paris; Dr. William Mitchell, London; Dr. Boedecker, Berlin; Dr. Forberg, Dr. Spring, Dresden, and Dr. Bryan, of Basle, and others. This symposium was one of the most interesting features of the meeting. When the full report is published your readers will understand its great importance.

On Thursday morning Dr. W. A. Spring read a paper on "The Carving of All Porcelain Crowns and the Biscuit Bake." Dr. Spring used high fusing material in the making of his porcelain crowns. This was quite generally discussed.

Dr. A. W. Harlan, of Chicago, read a paper entitled "A New Phase of the Coagulation Question," which reopens this subject. It was quite generally discussed.

Dr. S. H. Guilford, of Philadelphia, read a paper on "The Technical Training of Dental Students," illustrated by numerous models and specimens of the work of students in Philadelphia. This paper was well received by those who were engaged on the educational side of dentistry. In the afternoon Dr. Brophy, of Chicago, delivered a lecture on "The Surgery of the Palate," illustrated with lantern slides. This lecture brings the subject of "The Surgery of the Palate" up to date with the latest statistics concerning the Brophy operation. Dr. William Mitchell, of London, then read a paper entitled "Some Notes upon the Dentition of the Elephant and Injuries Thereto." This was illustrated by more than forty lantern pictures. This was a paper prepared with great care, and it was well received by those who are versed in comparative dental anatomy and pathology.

On Friday morning Dr. L. C. Bryan, of Basle, Switzerland, read a paper on "Some Special Cases of Bridgework" and "Keeping Models of All Patients." This paper was well received. Dr. C. F. W. Boedecker, of Berlin, read a paper on "Pyorrhoea Alveolaris." The reporter did not hear this paper read, but he believes from the discussions that took place that it was a most excellent and carefully prepared paper, as Dr. Boedecker is noted as a painstaking and careful observer. This closed the strictly literary portion of the program.

King Oscar of Sweden sent a communication to the president of the American Dental Society, welcoming the members to his capital, and regretting his inability to be present and listen to the learned papers and discussions, and tendered the good wishes of the government to the society in its efforts to mitigate the sufferings of humanity.

The following gentlemen gave clinics on Saturday, August 16:

Dr. W. A. Capon: "High Fusing Porcelain Fillings and Jacket Crowns." "New Removable All Porcelain Bridge."

Dr. Gordon White: "Models of an Extensive Case of Pyorrhoea, Arrest and Restoration, with Extensive Crowning and Bridgework."

Dr. Charles J. Monk: "A Case of Superior Protrusion and its Correction, Caused by Extracting Six-Year-Old Molars."

Dr. W. S. Davenport: His method of using the "contour wire" and making "a rigid cap," also part rigid and part pliable cap.

Dr. C. F. W. Boedecker: "Treating a Case of Pyorrhoea Alveolaris."

Dr. W. Mitchell: "Tinting and Staining of Porcelain Teeth, Using the Turner Furnace."

Dr. Paul Guye: "On Porcelain Inlays."

Dr. W. J. Younger: "Artistic Treatment of Teeth—Implantation."

Dr. J. H. Spaulding: "Demonstrating the Use of the Matrix."

There were about 200 present at the meeting. The American Dental Society of Europe passed a vote agreeing to give its full support to the St. Louis Congress.

GENERAL ANESTHESIA. (No. 3.)

Lecture Delivered Before the Senior Class of the Chicago College of Dental Surgery, April 16, 1902.

BY CASSIUS C. ROGERS, A. B., M. D., CHICAGO.

(CONTINUED FROM PAGE 218)

CHLOROFORM.—In a previous lecture we considered the pathological conditions in which we would hesitate to administer chloroform.

General Effect.—When inhaled chloroform acts differently from ether, the latter acting as a stimulant, the former as a depressant both to the tissues and to the cerebral centers, and also to the vaso-motor centers; you know that in the nervous system we have the cardiac-accelerators and cardiac-inhibitors, the vaso-constrictors and vaso-dilators; chloroform acts on the cardia and vaso-motor centers of the brain.

Stages.—We have three stages in general anesthesia, the first, second and third stages. We have those stages, as was stated at the last lecture, in ether anesthesia, and we have the same stages with chloroform. The only difference is that with chloroform the stages are much shorter. Chloroform produces general anesthesia much quicker than ether; therefore the stage of irritation, the stage of rest and the stage of excitement, in the first stage, are very much shorter.

Local Effect.—Ether cools the parts. It causes them to seem cold. On the other hand, chloroform seems cold at first and then it

has the reverse effect; it produces hyperemia of the tissues, and will produce a blister if placed on the true skin and covered over so that air cannot be mixed with it. As you may know, in stopping of peristalsis of the intestines, for spasm of muscles, and so on, there is nothing that will relieve these conditions any quicker than to place a chloroform poultice over the part where we have the spasm of the muscle or over the abdomen when we have stopping of peristalsis, severe pains, etc.; the peristalsis is started almost immediately and the pain relieved. It does this simply because it acts as a counter irritant. Therefore in giving an anesthetic with chloroform the face should always be well greased, the lips, the alæ of the nose, the eyes should be closed and the lids covered over well with oil, vaseline, lard, or some oily substance of that kind. When we have the part oiled over in that way the chloroform does not act as a counter irritant to anywhere near the extent that it does when it falls upon the skin proper. So please remember never to give chloroform without first greasing the face thoroughly, for if you do you will blister the mucous membranes of the lips, of the alæ of the nose, etc., which causes a great deal of distress, and it also makes the patient very unsightly for a time after he has recovered from the anesthetic.

Cause of Collapse.—Chloroform kills from depression and relaxation. The vaso-constrictors are relaxed, letting the blood vessels dilate. Therefore the people who die at the beginning of anesthesia with chloroform, die from paralysis acting directly upon the cardiac centers, while if they die later in the anesthesia, this is often due to cerebral anemia, or a lack of blood in the brain, in the deep vessels, and in the heart. The capillaries are dilated, the smaller arteries and veins are dilated, therefore the greater amount of blood is drawn to the capillaries and to the small arteries and veins, with the result that a person is practically bled to death, due to the peripheral vessels being full of blood or congested, while in the deep vessels the blood is practically absent, just the same as if a great deal of blood had been drawn off from the surface whereby a person bleeds to death, only that in the first mentioned case we say that the patient has bled into his own veins; the heart is practically empty, the deep vessels also, and the brain does not have the normal amount of blood, consequently the person dies from a cerebral anemia. This is when a person has been under an anesthetic for a long time.

It is known that if a dog's heart is exposed and the fumes of chloroform thrown directly upon it, that the heart will cease beating—it is paralyzed. That is what happens in case of death at the

beginning of chloroform anesthesia; it generally takes place at the very beginning, when the first whiffs are taken, or during the stage of excitement—the third step of the first stage of the anesthesia. Never give chloroform when a person is in this stage of excitement and struggling violently; the vessels are all congested, there has been a deep expiration, and if you have a great deal of chloroform on your mask and the person relaxes, he will take in a deep inspiration, the blood in the lungs will be filled with the fumes of chloroform, it is thrown directly into the heart, and you have a sudden paralysis of the heart and imminent death. It is just the same as if the fumes had been thrown directly against the heart muscle.

Preparation of Patient.—For the administration of chloroform the patient should be prepared just the same as I described for a general anesthetic with ether. Exactly the same precautions should be taken in every respect; therefore I will not repeat them this morning.

Conditions of Respiration.—Not more than four per cent of the air inhaled should be the fumes of chloroform—ninety-six per cent of it should be pure air. The room in which the anesthetic is to be given should be a light, airy room. Never give a general anesthetic in a room where the air is foul, because it simply adds to the danger of the anesthesia. The room should be well ventilated; a draft should not, however, fall upon the patient, because people catch cold very easily when asleep under a general anesthetic. Therefore a draft should never be allowed to fall directly upon the patient when he is asleep with a general anesthetic.

Administration.—Place the mask not closer to the face than four inches when you start the general anesthetic. The best way to give chloroform is by the drop method; simply hold the mask about four inches above the face, letting drop by drop fall upon the mask. After the patient has passed through the stage of excitement, all that is necessary is simply to drop sufficient to keep him asleep, and that is about one drop with every inspiration; therefore if you have your dropper regulated so that just previous to each inspiration a drop of chloroform falls upon the mask, you will under normal circumstances have sufficient chloroform to keep the patient asleep. After the patient is asleep, the mask can be lowered to about two inches of the nose; it should never be placed closer than this. The way the masks are built, with a concavity towards the face, if the mask lies against the face it will bring the gauze on which the chloroform is dropped about two inches from the face.

Precautions.—The patient should be watched the same as in anesthesia with ether, only, if anything, we must watch the patient closer. The patient dies either by paralysis of the heart or paralysis of the respiratory center. They die more frequently with paralysis of the heart noted first, but in some cases paralysis of the respiratory center has been noticed first. Therefore we must watch both the respiratory centers and the cardiac action.

The room in which chloroform is given should not be below 70° F. In tropical climates chloroform is not nearly so dangerous a drug as it is in the north, and in this climate there are not as many fatalities in the hot summer months as in the cold winter months. That is due to the fact that the fumes are more readily diffused in a warm room or in a southern atmosphere. The fumes are heavier than air, consequently they fall with gravity; therefore, if the mask is held quite a distance above the face the vapor falls and the patient will inhale a certain amount of it. Remember, then, to always have a warm room in which to give chloroform. Of course the room should be comfortably warm at any time, but the room in which you are operating under chloroform anesthesia should be warm, in my judgment almost up to body temperature—85 or 90 degrees. It is a little uncomfortable for the operator, but it is a great deal better for the patient, and that is what we should always look out for in an anesthetic.

In producing anesthesia with chloroform, produce it gradually. You cannot force chloroform like you can ether. If you charge the air that the person is inhaling with fumes of chloroform more than four per cent, it adds a great deal to the danger, and the more you have of it over four per cent the greater the danger. Therefore if you have a mask right down over the face and have the air charged with the fumes of chloroform, your patient is in a dangerous condition always. Remember, then, to have plenty of oxygen present, and it is always well to have a can of oxygen at hand, so that if the patient starts to collapse the chloroform can be removed and oxygen inhaled immediately.

The respirations should be watched closely, and normal respiration distinguished from false respiration. In the administration of chloroform, as well as ether, there will be a movement of the chest wall when the patient is taking no air in the lungs. The respirations should be taken often; the number of respirations should remain practically normal after the patient is asleep. The pulse-rate should remain practically normal, perhaps increased to a slight extent. The pupils must be watched; they should contract at first, and after dilation has taken place, if this is marked, the

anesthetic should be suspended for a time. The color of the face is another very important thing to watch in chloroform anesthesia; if the patient is not getting the proper amount of oxygen the face will become blue or livid, and this is an indication also that the anesthesia must be dispensed with for a short time. However, you cannot remove the anesthetic in chloroform anesthesia, as you can in ether, for quite a number of minutes, because a patient comes out from under the influence of chloroform much quicker than he would in the case of ether. Therefore remember that chloroform cannot be suspended for a great length of time, for if it is the patient will again go through the stage of excitement, and you want to keep the patient under the influence of the anesthetic sufficiently to avoid a second stage of excitement.

Vomiting.—In chloroform anesthesia the patient has a tendency to vomit, not as frequently, however, as in the giving of ether. But mucous forms and the mouth and pharynx must be kept free. There should always be tongue forceps present to pull the tongue forward and upward if necessary, so that it will not fall back and clog the pharynx.

All foreign bodies should be removed from the mouth—false teeth, a crown that is loose, anything of that kind should not be risked without proper care taken of it before the anesthesia is started, for in the struggle of the stage of excitement a false tooth may be broken and fall down in the larynx and cause asphyxia of the patient before the anesthetizer is aware of it.

Position of Patient.—The patient must be kept in a recumbent position. Ether may be given with the patient in a sitting posture; nitrous oxide is ordinarily given in a sitting posture; but not chloroform. Chloroform has a tendency to produce, as stated, cerebral anemia. If the patient is in a sitting position this adds greatly to the gravity of the case as far as cerebral anemia is concerned. Therefore the patient should always be in a recumbent position, and if anything the limbs and hips should be higher than the head.

Resuscitation.—To resuscitate a patient who has too much anesthesia with chloroform, you should always have present a hypodermic of strychnin, 1-30 of a grain. You should have the spirits of ammonia present so that this may be inhaled. If it is a paralysis of the cardiac center the oxygen tank should be ready so that you can administer oxygen if necessary. In giving anesthesia in private homes you may not have all this apparatus; but you should always have a hypodermic filled so that you can use it at a second's warning if necessary. In giving a general anesthetic of any kind there is no excuse for a man who does not have a hypodermic syringe all

ready to use at a second's notice. One-thirtieth of a grain of strychnin should always be ready so that you can use it hypodermically; that can be repeated in fifteen minutes if necessary, and that again in fifteen minutes if necessary. You can give these patients large doses of strychnin.

I would not advise the administration of amyl nitrate to resuscitate a patient under a general anesthetic. Amyl nitrate acts quickly; it stimulates a person as rapidly as anything that you can get, but the after effects are very depressing; the stimulating effects are soon over, and the patient dies after the effects of the amyl nitrate have passed away. Be careful about using amyl nitrate—it is a dangerous drug.

At the present time the use of morphine in general anesthesia is coming into vogue. A hypodermic of morphine, $\frac{1}{8}$ to $\frac{1}{4}$ of a grain, with 1-100 to 1-150 of a grain of atropin, is given hypodermically about fifteen minutes before the anesthetic is begun. This acts very nicely in some cases, especially when you are going to give ether. I would not use this method before giving chloroform, because chloroform is a depressant and morphine is a depressant, therefore the danger to the patient would be greater. Ether acts as a stimulant, hence you can use morphine and atropin. Atropin counteracts the depressing effect of the morphine, and by watching the patient with great care it is wise sometimes to administer morphine before giving the general anesthetic. You can produce general anesthesia with a great deal less ether in this way than you can if you simply use the ether without morphine; but morphine has a tendency to dry mucous membranes, therefore in kidney diseases and in diseases of mucous membranes I would not advise the administration of morphine beforehand, neither would I advise the administration of morphine afterwards to relieve pain. Morphine is a dangerous drug at any time, and it is not a good drug to administer to a patient hypodermically before he is out from under an anesthetic or within a few hours afterwards. Of course, if the operation has been one followed by great pain, it is sometimes necessary to give morphine to relieve the pain.

NITROUS OXID.—We have one other substance which is used for general anesthesia, and it is one that is used in the dental profession a great deal more at present than it is in the medical profession and that is nitrous oxid. Nitrous oxid is given in an entirely different manner now than it was a few years ago; then in the administration of nitrous oxid it was thought that to keep the air entirely away from the patient assisted in producing anesthesia; it undoubtedly does, because it practically asphyxiates the patient.

Now they have a mask to go over the nose or a horse shoe arrangement which fits the hard palate to go into the mouth so that general anesthesia with gas may be produced. On the inside of the nose piece is a valve which permits the air to be thrown in and out, so that the patient does not get blue or livid, and the spasms of muscle, and so on, which were produced a few years ago, are diminished. In giving general anesthesia from gas the patient should not get blue—slightly blue is all that you should allow him to become. The patient should get air, he should not struggle violently. If he does there is something wrong. In giving nitrous oxid at the present time the patients do not struggle; they do not become blue. Probably it takes a little longer to put them to sleep when giving nitrous oxid now than it would if you were to simply strangle them, as was done a few years ago; when all that is inhaled is the nitrous oxid, they become very blue, the red blood corpuscles lose their oxygen and become charged with carbon dioxid, and asphyxiation practically takes place. Anesthetization by this method lasted about thirty to fifty seconds, therefore the work had to be done very rapidly after the mask was removed. Now the mask that fits over the nose permits the patient to breathe oxygen and with it a certain amount of nitrous oxid which permits one to keep the patient asleep as long as necessary, that is, in cases where the nasal passage is not obstructed; if the nasal passage is obstructed the horse shoe arrangement which fits into the mouth can be used, the patient breathing through the mouth instead of the nose, and in that way you can keep all patients asleep as long as desired. Of course, in giving nitrous oxide it is better to have the patient in a recumbent position, but from the dental standpoint this is almost impossible, as the dentist prefers the sitting position; but of the general anesthetics it is the least dangerous to administer nitrous oxid in a sitting position, and ether stands next.

LOCAL ANESTHETICS.—We have a great many local anesthetics, but I will speak of only two or three this morning. There are many local anesthetics that come into vogue, remain a year or two, then become obsolete and are soon forgotten.

Cocain.—Cocain is a local anesthetic that is used a great deal in the medical and dental professions. Eucain is taking the place of cocain to a certain extent at the present time, but cocain is still used a great deal.

As to the symptoms of cocain. Any of you who use cocain in extraction, if you watch your patients and have sufficient knowledge of the subject to know when your patients have toxins from cocain,

will find that you cannot extract a dozen teeth without seeing the influence of cocain upon the system. The first thing is vertigo; that is, the patient has a slight giddiness or dizziness. It does not amount to very much, but that is the first sign of cocain poisoning. The patient will tell you that he feels a little unsteady. The next symptom is a slight dilatation of the pupil, very slight. Notice the pupil before you start to inject the cocain, then notice it afterwards, and if the cocain is producing a slight irritation on the reflexes there will be a slight dilatation of the pupils; if there is a great deal of irritation you have a larger pupil, but you cannot, in my judgment give a hypodermic injection of cocain to extract a tooth without getting a slight dilatation of the pupil. I would advise you to watch this.

The next thing is that the patient says his hands and feet are cold, and by feeling the hands you will find that they are cold.

Then there is palpitation of the heart—the heart commences to flutter and the patient commences to get excited; he feels that something is wrong, and just as soon as the patient becomes excited and you lose his confidence, he needs care and needs it quickly. After palpitation of the heart commences the pulse begins to get slow with a high tension caused by the constriction of the vessels. There is dryness of the mouth; no matter if the cocain is used directly against the mucous membranes or if it is injected in some distant part, as the foot, the mucous membrane of the mouth will feel dry, first in the fauces, and the patient will ask for a drink of water to moisten the mouth. That is due to the absorption of the cocain. Then he will become very restless, and you will have to place him in a horizontal position on the table, keeping his confidence if possible; following this restlessness comes delirium, and after delirium, if it exist any great length of time, comes death. Therefore in using cocain, be very cautious about it, noting the very first symptoms—a slight vertigo, slight dilatation of the pupil; when you get that be careful.

Antidotes.—About amyl nitrate in cocain poisoning. That is the drug we use most often in this condition, for the reason that it acts quickly, and in cocain poisoning you have to use something that acts quickly; if you do not you have paralysis, and the patient is out from under your control before you realize it. But when you give amyl nitrate, do not forget to give a cardiac stimulant before you lose sight of your patient. It is a dangerous thing to give amyl nitrate and allow your patient, who may seem practically well, to start home, for he may collapse before he has gone a great distance. Always administer to these patients 1-30 of a

grain of strychnin before you let them leave your office, keeping them a short time until the strychnin has commenced to take effect. It is not necessary to administer the strychnin hypodermically; it may be taken by the mouth, because the amyl nitrate will last long enough for the strychnin to be absorbed by the stomach. If you wish to be sure that your patient is going to have no ill effects afterwards, keep him in your office a half hour. Of course, these are rare cases. I do not mean that you should keep every patient to whom you administer a little cocain to extract a tooth. You will probably not see many of these cases in a lifetime, but it is the case that *does* collapse under the influence of cocain that you must watch. The majority of patients who take cocain may have a little dizziness, slight dilatation of the pupil, a small amount of excitement, slight pains of the face, but it is all over in a short time and there are no after effects; but you get effects with a very small amount of cocain, and you sometimes have the serious effects of cocain poisoning. There are some individuals who cannot take cocain at all; even the smell of cocain will cause them to faint. In those individuals you must keep cocain away. Eucain can be used in those cases very nicely. Schleich's solution is one that can be used to great advantage in those cases.

Schleich's Solution:

Distilled water....................	1 quart
Cocain	30 grains
Morphine	$3\frac{3}{4}$ grains
Salt	30 grains

That makes a weak solution, but it is one that is a great deal safer than the solution of cocain by itself. The addition of salt aids in the absorption of the solution, whereby it will act much quicker.

A solution of cocain should be kept sterile if it is going to be used for injecting purposes. Cocain solution can be boiled two or three times without spoiling the effect of the cocain, but repeated boiling to sterilize would destroy the effect of the cocain. Eucain, however, can be boiled a great many times without injuring or destroying its anesthetic property.

Cocain of itself does not remain sterile; it becomes infected by coming in contact with the air, and it will infect the part in which it is injected if it is put in without being sterilized. A great many cases of infection from cocain, supposed to be due to dirty or unsterilized needles, are due to infection of the solution. The

needle should always be properly sterilized before it is used, and the cocain should be sterile.

Pressure Anesthesia.—We have local anesthesia produced by pressure. You can inject near a nerve a solution so as to make a pressure. Sterile water will anesthetize a part for a certain time on account of pressure. Cold will anesthetize. The ancients used this method a great deal to produce local anesthesia. Applying ice to a part will bring it almost to a frozen condition, causing loss of sensation, and minor operations can be performed. A spray of ether can be used to numb the parts for local anesthesia. Ethyl bromide and ethyl chlorate are also used, the latter, however, not used at present as much as a few years ago; it freezes the part, and to cut through the frozen part causes nearly as much pain as to operate without it.

Cocain and eucain are the principal anesthetics and the ones that I would recommend you to use; but you must also use your common sense, exercising a great deal of precaution in their administration.

BACTERIOLOGY AND PATHOLOGY.

BY GEO. W. COOK, B. S., D. D. S., CHICAGO, ILL.

(CONTINUED FROM PAGE 170)

We have discussed at some length the colon group of bacteria for the simple reason, from a biological standpoint they form one of the most interesting groups of micro-organisms; they have been more or less studied by all bacteriologists with an effort to see if there could be any relations established between certain pathological lesions of the intestinal tract, and this group of micro-organisms.

A great many writers and investigators have at times questioned as to whether or not some member of this colon group did not pass into the typhoid bacillus, etc. The great variation in morphological appearance, and the natural habitat of both colon and typhoid are very much in common, and are frequently found in various localities together.

The Eberth bacillus was considered for a long time after its discovery to be easily a recognizable specie; but farther study and research has revealed the fact that the variability of form and physiological activity are greater than was at first thought. It is now a question with a number of investigators whether or not these micro-organisms are of a variety of one specie, or are they a related specie.

Quoting the words of Victor C. Vaughan, he says: "I am ignorant of any crucial test or any combination of tests, upon the strength of which I can say at present, that a germ that I may find in drinking water is identically with the so-called typhoid bacillus." He says further: "I have found in spleen after death, germs which differ from the typhoid bacillus obtained from Berlin. That there is a difference in the typhoid bacillus as regards its pathological and physiological processes, there is no question."

As we have previously said, we have what is usually recognized a number of different forms of the coli bacillus, which are usually spoken of as paracolon. There has also been four varieties of bacilli found in water by Vaughan, which he designated as typhoid bacilli which he found in water. This same group has been called by other writers the paratyphoid group. As we have just said, the problem of differentiating between the so-called colon group and the so-called typhoid group is considered at present no easy task, but it is much more difficult to determine the difference between those typhoid germs that produce the disease, and those that we call typhoid-like bacilli, or the paratyphoid.

Hiss seems to come the nearest of giving us a culture media, whereby we are better able to differentiate between the typical colon forms and the typical typhoid. As I have said before, I have used this media with considerable success.

The typical typhoid bacillus does not ferment carbo-hydrates with the formation of gas, but they will ferment saccharides and monosaccharides with the formation of acid, while as a rule the colon group ferments dextrose and lactose with gas formation; but saccharose is not fermented.

Upon the enzymatic action of bacteria on glucose, lactose and dextrose, seems to depend the possibility of determining the difference between the true typhoid bacillus and that of the colon group.

Right in this connection I will give two or three of Hiss's formulas for the differentiation of the colonies of typhoid and colon bacteria. These different compounds were used extensively by J. C. Cook and myself, in our work in this group of micro-organisms. However, there was some modification; in a few instances we modified the method of obtaining the acid reaction by alkalizing the media with sodium carbonate, thus bringing a slightly acid condition by the use of lactic acid, and various organic acids; the acid reaction was brought about only in the agar formula.

I will here give the two first formulas of Hiss's that were used, and then I will give the modification that we used in some of our experimental work:

No 1.	Agar	15 grammes.
	Gelatin	15 grammes.
	Leibig's extract	5 grammes.
	NaCl	5 grammes.
	Dextrose	10 grammes.
	Distilled water..........	1,000 cubic centimeters.
No. 2	Agar	15 grammes.
	Liebig's extract	5 grammes.
	NaCl	5 grammes.
	Dextrose	10 grammes.
	Distilled water..........	1,000 cubic centimeters.

In the above formula in some instances we changed the dextrose for lactose, not using as large a percentage as was used of the dextrose; the media when prepared in this way was made of considerable alkali by the addition of sodium carbonate; we then used lactic acid and propionic acids to neutralize the alkalinity of the media. In some instances we used malic acid and also tartaric acid..

In the isolation and differentiation from the intestinal contents I am inclined to believe that this modification as used by us will in some instances yield fully, if not greater accurate results. However, the media used by Hiss is certainly a great benefit. Many times this personal equation of the individual must necessarily enter more or less into such intricate problems, such as the investigation and differentiating the morphological and physiological phenomena, as found in this group of micro-organisms.

A point that I will speak of here that revealed itself in our investigation was, that when lactic acid was used in the media the developmental process of the colonies seemed to become more or less self-limiting of the typhoid bacillus. This attracted my attention to another phase of the subject; by using a bouillion containing dextrose neutralized with lactic acid, in the way above described, filtering out the bacteria; after forty-eight hours' growth the media had a very toxic effect on rabbits and guinea-pigs; but this condition passed off in about four days, and after a lapse of four or five days from the recovery of the animal, a repeated inoculation with this substance, had so far as I could determine, no toxic effect. This condition did not seem to be true with any of the other acids described above. This observation may not be of any special importance, it simply goes to show how easy these micro-organisms may be changed. There is one point here to which I wish to call attention, that is, we have not used any peptones in these formulas as above given. The method that I have used principally for the purpose of isolating the typhoid bacil-

lus, I use a culture dish very much larger than the ordinary one; I first used dishes about six inches across, and later I have been using a ten-inch dish, in which I place from fifty to sixty c. c. of the culture media; while it is still liquefied, I take my tubes in which inoculations have been made in the usual way in bouillion; I then pour from my tubes in which my inoculations have been made into the dishes containing the above amount of culture media containing agar, as a stiftening for the media. I know of no better way to describe methods of isolation of the typhoid bacillus, and especially from intestinal contents.

Right in this connection the question might naturally be asked: Where is the typhoid bacillus usually found? The natural distribution of this micro-organism is one by no means settled.

Man usually becomes infected with this disease through water supply. The investigation of Klein and others, point to the fact that these micro-organisms maintain their physiological phenomena much better in the earth and water, rich in nitrates, in fact, their demonstrations seem to show that their life function was not maintained for any great length of time in the ordinary sewerage, but if nitrates be added their physiological function was maintained indefinitely. Robertson carried on some very interesting experiments, by removing the turf and planting the typhoid bacillus eighteen inches in the soil; then replacing that turf he found that after a hundred and thirty days, the quantity of the Eberth bacillus had increased. He had also found that these bacteria had grown to the surface of the earth and was abundantly distributed over a considerable area.

Some of these experiments were tried during the summer months; during the winter months they could not obtain the bacterium from the soil, but in the following spring the soil was treated with bouillion, and these areas of soil in which the micro-organisms had been planted showed a great abundance of the organism. These experiments indicate that poluted soil may be the source of infection for an indefinite period; they are also borne out by clinical observation. Vaughan and others observed that a regiment of soldiers going into camp, where another company had vacated, the latter having typhoid fever, the disease would break out among the soldiers that last inhabited the camp ground. This has well been borne out from observation in towns and cities.

The typhoid bacillus may be transported by means of milk and water. Dr. J. B. Brown and myself, whom I have mentioned before as an associate in laboratory work, investigated an outbreak of typhoid fever, due to the infection of milk from a family from which

there had been two cases of typhoid fever. They furnished the milk for a number of families in the community. There was some twenty persons that were undoubtedly infected from this source; the last case appearing about eleven months after the two cases appeared in the family running the dairy.

Many observers have reported similar incidents to the one just related.

It was believed by a great many long before the specific micro-organism of this disease was discovered, that the soil played a very important part in the etiology of typhoid fever. It was thought by some that where chemical disintegration of organic matter took place, in or on the soil, that such a chemical change resulted in the formation of the active factor of typhoid fever.

Pettenkofer's observations during an epidemic of this disease in Munich led him to the belief that the micro-organism must pass a certain period in the soil, and then it was taken up and spread by the air to susceptible individuals. According to his belief the bacillus obtained its virulent properties from the soil in which certan putrefactive changes were taking place rather deep down beneath the surface of the earth; but later observations by others have rather disproved his idea of the dissemination of the germ through the air, but that rather they percolated through the soil and became lodged in cess pools, springs and wells from which drinking water was obtained. However, we do not wish to be understood that transmission is not possible through the air.

Drinking water undoubtedly is the greatest means of conveying the germ to susceptible individuals. The germ can be disseminated by flies; this has been observed where proper care was not exercised around persons sick with the disease. Flies were allowed to come in contact with excrementatious matter in the sick room, afterwards coming in contact with food and drink.

The hygienic board, which was making observations on the etiology and spread of typhoid fever, in '98 observed that the soldiers whose mess tents were screened and kept free from flies were not attacked in the same proportion as those who did not take this same precaution. Ice and various kinds of salads, etc., have been shown to be a conveyer of this germ; celery and other uncooked vegetables have been known as means of conveying this micro-organism.

W. H. Conn made the observation that oysters may become infected during their fattening and freshening process, thereby being the means of spreading the disease. Lavis observed that an epidemic in Naples was caused by infected oysters. Broadbent also observed the possibility of such contamination; thus the ultimate

spread of disease. Foote's interesting investigations show the Eberth bacillus will live much better in the fattening ground of oysters, even when the water is frozen, and that the bacillus will live in the oyster itself. There is no positive evidence, however, whether the micro-organism will multiply in the oyster itself or not; this is a question for further investigation.

I have here enumerated a number of phases under which this micro-organism may live and carry on its physiological activities under the most varied conditions; in one instance it may live in such well known protoplasmic structures as the oyster, in another instance it may live in salads or ice. The complex phenomena of this micro-organism as well as many others, is what leads to such ontological speculation in unscientific minds as regards the causation of this disease.

In the study of this or any other micro-organism it is necessary to consider the readiness with which they adopt their new environing conditions. If we could trace one of these bacilli to where it enters the body of an oyster, where it may have the inability to grow and propagate its specie; there it might live a dormant existence for an indefinite period and eventually be transportd into the intestinal tract of a human individual, and there begin to grow and develop an immense colony of its specie; thus begin a stimulating influence on certain kinds of tissue in that intestinal mucous membrane; for it is well known that its primary seat of action is on the lymphatic tissue of the intestinal tract. Thus it can be seen that it has either inherited or acquired a selective influence upon certain molecular structure.

The pathogenic activity of this germ is good, so far as we know, for man only. The disease does not occur in the lower animal, for no one as yet has been able to produce this disease in them. Thus it can be seen that Koch's third rule has not been complied with in the common acceptation of its application; for man is the only animal as yet subject to the disease, and yet it prevails throughout all parts of the world, and especially in temperate climates.

Imperfect drainage and water contamination is usually looked upon as the great source and spread of this disease. In fact the improved sanitation has done much to reduce the mortality of this disease, especially in large cities. However, the statistics as gathered by Osler, show that the disease is on the increase in the rural districts. In 1890 the death rate from typhoid fever per 100,000 of the population of the United States was 46.27; in England and in Wales, 17.9; in Italy, 65.8; in Austria, 47.00, and in Prussia, 20.4; these are as gathered by Osler. All persons exposed to this infection by no means take it. Individuals most susceptible apparently are those be-

tween the age of fifteen and twenty-five. The pathological lesions are, of course, in the intestinal tract, where the Eberth bacillus is to be found in great abundance; a catarrhal condition is always present.

As we have previously stated, the specific actions of the bacillus is on the lymphoid element of the intestine extending to the connective tissue, producing certain necrotic changes and producing the characteristic typhoid ulcers, the extent of which is extremely variable.

The miro-organism of this disease has been isolated from the blood and various excretions of the body, also from the hyperaemic spots so characteristic at about the tenth or twelfth day of the disease.

I have dwelt at considerable length on this micro-organism, not so much as it will interest us as a disease condition, but it is interesting and profitable as a biological phenomena, a basis upon which all disease factors must be placed before scientific pathology can be understood.

Right in this connection we will discuss another micro-organism, the physiological phenomena of which differs in many respects to the one we have just been mentioning. In 1885 there appeared a classical paper, Deutch. med. Wochenshr by Nicolaier. This author had been able by experimentation to produce tetanus in rabbits and mice by inoculating them with garden earth. Up till this time the disease commonly known as lock-jaw was a complete mystery. The condition frequently appeared many times when there was but a slight wound, but its appearance seemed to be always concomitant with some injury to the external surface of the body; thus suggesting that beyond the possibility of a doubt that infection of some nature took place through a breach in the surface of the skin or mucous membrane. In 1884 Carle and Rattone announced that they had been able to produce in some of the lower animals by inoculating them with material taken from a wound in tetanus, to these men is due the credit for the transmissibility of this disease. Nicolaier attempted to isolate this micro-organism on the ordinary gelatin media, but was unsuccessful, and pure cultures of this organism was not obtained until 1889, when Kitasato succeeded in isolating the germ from mice that had been infected from a local suppuration of a human case. At the time of this last named investigator's experiments he discovered that the germ would not grow with any degree of success in the presence of free oxygen of the air; thus accounting for the reason why the first authors were unable to obtain this micro-organism in free cultures.

We have previously discussed aerobiosis and anaerobiosis. At that time it was explained that these two biological phenomenas were

the result simply by adaptations due to the energetical process of nutrition. The isolation of the tetanus bacillus is somewhat a difficult one, owing to the fact that it is by no means easy to place cultures out of reach of the oxygen of the air. One of the plans usually adopted is that of taking advantage of resistence of the spore, a tube containing glucose agar is inoculated with the pus and incubated for forty-eight hours, at a temperature of 37 degrees C., when spore formation will take place; then by placing the culture at about 90 degrees or 95 degrees and keep it from forty to sixty minutes when all the vegetative forms will have been destroyed. A loopful of this culture is transferred to a glucose agar tube, the tube is then placed in a hydrogen gas and incubated at 22 degrees C.; after about four days a beautiful luxuriant culture will appear.

The pathogenic properties of this germ is established beyond any question and according to the rules laid down by Koch; for it can be isolated in pure cultures, and when inoculated into animals it produces the characteristic symptoms of this disease. It occurs naturally in horses and in man. There are, however, other animals in which it produces the disease process. Its natural habitat seems to be in manure and garden earth; thus we account for the frequency of lock-jaw in horses after sticking a rusty nail in a foot.

The pathogenic phenomena of this germ is one that has stimulated a great deal of research, owing to the fact that the germ produces but little pathological disturbance in the locality of its inoculation, but it sets up a peculiar excited condition of the nervous system, and in the majority of cases it terminates fatal. This nervous excitation is due apparently, to the chemotactic properties of the substance formed as an intercellular product of the bacterial cell for the nerve cells of the individual. Perhaps it will be well for me to explain right here what an inter-cellular bacterial cell product is. It is a substance formed inside the cell wall of bacteria and is liberated through the cell membrane, and in the case of human inoculation this substance passes out and is liberated in the tissue, and its great affinity for nerve cells at once becomes a nerve stimulant and consequently is the characteristic symptoms of this disease.

Brieger was the first to obtain a poisonous substance from cultures of the tetanus bacillus. At that time he found four agents that produced four distinct and separate conditions. The first one of these produced the disease in mice, when only a few milligrammes were injected; it was a stable compound in an alkali solution, but neutralized acids. The second one of these has been called tetanoxin; this agent produced the characteristic tremors, followed by paralysis

and then by convulsions of more or less characteristic type of the disease.

In later research these crystalline bodies as found by Brieger have lost a great deal of their importance which was at first attached to them. Following the first research of Brieger, Frankel and he obtained a substance which was extremely soluble in water and when injected into animals caused tetanic convulsions, ending in death. Later Brieger and Cohn were able by filtering out the bacterial cell from cultures made in veal broth, containing one per cent of peptones and one-half per cent common salt, they after treating it with ammonia sulphate, obtained a poison from the solution. They were also able to obtain from one liter of this culture fluid about one gram of the poison; and it only required an infinitesimal amount to produce the disease in mice. It is about one hundred times more poisonous than either strychnine or atropine.

Fermi and Pernossi found that the cultures from agar was more poisonous than gelatin culture, and cultures in bouillion was even less poisonous than the culture medias just named. These observers also found that the more poisonous this enzyme is the more unstable is the compound. It is also rendered inert by raising it to a temperature of 55 degrees, but if this toxin be mixed with either ether or chloroform it will require a temperature of about 80 degrees; and when mixed with amylic alcohol or benzol it will require about 100 degrees C. If the poison be mixed with water a direct sunlight of eight or ten hours will render it harmless, while if dried it will take considerable length of time of direct exposure to the sun to render it inert. It has been found through the hydrochloric acid of the gastric juice to destroy its toxic process. Ptyalin, diastase and emulsion, apparently have no effect upon the active poisons.

Madsen made a discovery that the poison taken from bouillion cultures of the tetanus bacillus had the power of dissolving the red corpuscles of a number of animals, viz., the horse, sheep and goat; rabbits blood was specially susceptible. This same author found it possible that this hemolytic action of this poison could be arrested by an antitoxin.

There has been a number of different substances, the chemistry of which is not well known, obtained from cultures of the tetanus bacillus, all of which seem to have a more less toxic effect upon the animal body, especially those susceptible to the disease.

It would be quite out of place to attempt to enumerate the various names and their action upon the animal body. We will speak of them here as toxines. Donitz found that when the tetanus toxin was injected into the brain or spinal cord it produced death almost

instantaneously. He found that one-twelfth of the dose of that injected into the animal circulation, when injected into the central nervous system was much more fatal.

A very strange phenomena was demonstrated by Wassarman and Takaki, and that was when the tetanotoxin is combined with nerve tissue and injected into susceptible animals, the substance would not produce any of the characteristic poisonous symptoms, while if the same quantity of toxin was used with the tissue from the kidney, spleen, liver and bone marrow, and likewise injected it had no poisonous effect upon the animal treated. These preparations were made by removing the tissue immediately after death and masserating in a normal salt solution and adding the toxin. This emulsion, as was stated, was injected into animals which were known to be susceptible to tetanus. Those inoculated with the emulsions of other tissue had all the characteristic symptoms of the disease.

These experiments demonstrated conclusively that emulsions from the spinal cord and brain form inert compounds with tetanus toxines. It required a great deal more of the mulsions of the cord than that of the brain to neutralize the toxic properties of the toxines.

Roncali experimented with a numbr of micro-organisms, both pathogenic and non-pathogenic, to determine if possible if any of these micro-organisms would destroy the toxic properties of the tetanus bacillus. His results were negative, in fact, it was found that it increased the toxic properties of this germ.

In a comparative study of the typhoid bacillus and that of tetanus, we are forcibly struck with the vast difference as regards their physiological activities and their pathogenic properties. In the one it is necessary to have the oxygen of the atmosphere, while the other must be excluded. The one in order to produce its pathological lesions and bring about the characteristic symptoms of the disease, has to act in certain tissue cells such as the lymphoid tissue of the intestinal tract, while the other has no special tissue in which it can produce its characteristic symptoms. The typhoid bacillus will produce necrotic areas; it runs a definite and well defined course, ending many times in recovery, while the bacillus tetanus will only produce a small localized foci with slight pus formation; but liberating an agent in the tissue, a powerful toxin that is extremely fatal to both man and many of the lower animals.

The disease known as lock-jaw is as old as time and it has always been considered an extremely fatal disease, and it is certainly one of the most agonizing and awful deaths. I have personally had

the privilege of seeing three or four cases in man, and a number in the lower animal such as the horse, rabbit and guinea-pig. There are a number of the lower animals that are immune to the action of the organism.

PROPHYLACTIC ITEMS.

BY R. B. TULLER, D.D.S.

(THE FIRST OF THESE ITEMS BEGAN IN JULY)

About the tooth brush:

I contend for a small one. Why?

Because if teeth are brushed in the manner approved by the best authorities most brushes are too bulky and clumsy and abort the effort to some extent.

If I were making tooth brushes I would make some with but two rows of stiff bristles.

There are some "prophylactic" brushes on the market that are all right in shape of handle and arrangement and cut of bristles, except too many rows.

They were designed by dentists who had given some thought to the matter.

Some are made with three rows of bristles—better than four. Two rows will do better work, and may be cleaned, sterilized and dried out better for another thing.

Brushing the teeth crosswise is not wise. Up-to-date dentists do not advise it.

It don't hurt the teeth, but does injure the gums.

Some would-be cultured people still say "gooms." "Doctah, what can I get for a good goom-wash?"

Fury! Don't it make you tired? "Gooms" must have come from Boston, but it harrows up your feelings.

A stiff brush harrows up the *gums* when used in the usual crosswise manner.

This harrowing, in time, results in evils hard or quite impossible to remedy.

The gums subject to this continued wounding are eventually pushed away from the line of enamel.

Exposed necks of teeth become exceedingly sensitive frequently and also frequently decay.

There's a better way than brushing cross-wise. Brush the upper teeth downwards and the lower teeth upwards.

This way will not tear the gums, and food is more effectually removed from between the teeth.

And the stiff, narrow brush does this better. It is the sweeping motion that does it.

Put two brooms together and try to sweep. You'll soon find one is better.

Sweep your teeth.—O, fudge! No, not with a broom. Who said so?

Sweep with your tooth brush and save your gums, and remove more food collections.

Some day we'll have brushes with but two rows, and they will be found better. I've had some made and tested them.

They are not on the market; so use the next best—three rows of bristles. They are not bad.

Most any brush is better than none.

For upper teeth, lift the cheek away with back of brush and place bristles above teeth and sweep down.

For lower teeth reverse the order.

That is the way for outside and inside. Across the tops brush in all directions.

Explain it all with care to your patients and you'll render them and yourself good service.

You won't see so many gums pushing away from necks of teeth.

Tell them, too, the importance of keeping the brush clean and sterilized.

I was going to suggest a nice clean linen rag as an adjunct to the brush in cleaning teeth; but I don't like the word rag—in connection with the teeth.

It is, however, cleaning we are talking about and not mastication.

What I want to talk about just here is a nice clean (sterilized) piece of linen or cotton.

The little inexpensive mouth napkins made up and sterilized for dentists' use are about the thing—to be thrown away—or *burned*—after use.

You can *rub* your teeth cross-wise or any way with such a thing as that over the end of the finger.

Do it before brushing—and after, too, if you like—if a clean fresh piece is used.

Used before, you place the finger over each tooth on the gum and press firmly, forcing out secretions under the free edge of gums and wipe away with the napkin.

This is a sort of massaging process and is a good daily practice with the bare finger, not to mention the napkin.

The napkin removes some secretions about the teeth better than the brush, but is not advised in place of brush. Do what can be

done with the cloth, even to wiping the tongue, and then use brush as already described.

The tongue should be kept clean as well as the teeth, if you want a sweet breath.

Three or four inch sterilized bandages, to be had in rolls at any drug store, will make napkins, clipped off from roll as wanted.

(Much better for baby's mouth, too, than any rag washed out in the family wash.)

After the brush, what? Floss silk, of course, to be used between the teeth where neither brush nor cloth can reach. Small rubber bands answer a like purpose.

The massaging of the gums every day, pressing out secretions at necks of teeth, serves to prevent, to considerable extent, the deposit of calcic salts which lead on to that bane of civilized humanity, pyorrhoea alveolaris.

There is more in this than many of you think.

Say, isn't it a pleasure to work in a nice, sweet hygenic mouth, from sweet sixteen upwards, even, there isn't very much to do?

You'll get due credit for any good ideas in prophylactics you may send in. The field is broad.

NON-COHESIVE GOLD.

Read Before the Northern Iowa Dental Association, September 2, 1902.

BY J. V. CONZETT, D. D. S., DUBUQUE, IOWA.

Mr. President, Members of the Northern Iowa Dental Association, Ladies and Gentlemen:—

Notwithstanding the recent exploitation of porcelain, admirable in its place, the great improvement in amalgams, due to the classical experiments of Dr. Black and the several very good cements recently placed upon the market, gold still maintains its place as king of filling materials. The ability of an operator is measured by the standard of his gold fillings. No man can be a good workman that does not thoroughly understand his materials, so no dentist can be a good operator that does not thoroughly understand his filling materials. It will be unnecessary for me to go into a discussion of the chemical and physical properties of gold. Every dentist is as familiar with those properties as I am. Besides, if I were to attempt that this paper would be prolonged far beyond its allotted time. I shall confine myself to but one phase of this great subject and that a much neglected one, by modern dentists, non-cohesive gold. I say neglected by modern dentists, for we know that the operator of old used

only the non-cohesive gold, and if the gold showed any quality of stickyness it was discarded and counted as no good. All this has been changed since Dr. Arthur discovered the cohesive property of gold, and nowadays the pendulum has swung to the other extremes and today unless a gold possesses the property of cohesiveness in the highest degree, the dentist discards it and finds for it no use. One of the foremost teachers of dentistry in a book recently issued by him on operative dentistry, said that he could find no occasion to use soft (that is non-cohesive) gold. Non-cohesive gold is often spoken of as soft gold, a misnomer, not in the sense that it does not possess the quality of softness, but misnamed by reason of the fact that the name suggested that cohesive gold is a hard gold. Both are equally soft if annealed, and the only reason that the non-cohesive gold was thought to be soft was because the particles not cohering the one to the other made the gold easier to work and seemed soft and plastic in comparison with the more intractible cohesive foil. All pure gold is cohesive. I know that certain manufacturers claim that their gold, though non-cohesive, is yet pure. Mr. John Hood in a paper published some years ago, defied any chemist to find any impurity in his non-cohesive foil. Nevertheless, the fact remains that gold in its pure state is cohesive, and it is made non-cohesive by subjecting it to the fumes of various gases, which, forming a film upon the surface of the gold, make it non-cohesive. The gas that is usually used is ammonia, which being a volatile gas, is easily driven off again by heat, and therefore we find that the non-cohesive foils in ordinary use become cohesive upon being annealed. Dr. Black very beautifully illustrated that in a series of experiments made by him and published in the XII volume of the Dental Review, a paper I would refer to any one that may be interested in a farther study of the subject, for in this paper we must of necessity hasten over this part of the subject. There is one form of non-cohesive foil that maintains its non-cohesiveness despite the heat that may be applied to it and it is this gold that Mr. Hood maintains is made non-cohesive by a secret process and yet is pure. Others tell us that carbon dioxide, forming a film upon the gold, cannot be driven off by heat, and the inference is that such is the case with all permanent forms of non-cohesive gold. That the impurity in the shape of a film is on the surface of the gold is not only shown by its being driven off by heat, but by the fact that if a large roll is made of the unannealed non-cohesive foil and then the rope be cut in the middle, the several ends will cohere. Also, it is said that non-cohesive foil will cohere where the instrument is picked through the foil and then other foil picked through this, the claim being that the inner torn surface would be

cohesive. Now, *is* there a place for non-cohesive gold foil in modern operative dentistry, and if so, how shall we use it? Thanks to the labors of such men as Drs. Black and Wiedelstaedt, we have been shown that there is a place and a large and valuable place, for non-cohesive foil. By reason of its non-cohesiveness it adapts itself to the walls of a cavity better than any other form of gold. Having the softness of other forms of gold, united with the fact that it does not ball up and bridge over a space, however small that space may be, it spreads under the force of the mallet properly directed until a perfect adaptation of the walls of the cavity are secured. It is most valuable material in the cervical margins of approximal cavities in bicuspids and molars. The cavities should be prepared by the step method, the walls as square as it is possible to get them, and a flat seat, thus making the angles at the bucco-gingival and lingo-gingival perfect right angles. The gold is prepared by folding up a half or quarter of a sheet, as the cavity may demand, into a narrow ribbon and then roll it up on a jeweler's broach until it is the required size; one such pellet is accurately placed in both buccal and lingual angles, and then another piece is wedged in between the two and the whole malleted down to a homogeneous mass. Then, by commencing with cohesive foil in the step of the cavity, the filling is completed with non-cohesive foil. Another place that it may fill very beautifully and quickly is a coronal cavity in any of the molars. The cavity is prepared with a flat seat; if not possible to obtain a flat seat by reason of too extensive decay, cement may be used to build the floor of the cavity to the proper shape. Then preparing the pellets as before, they are placed all around the walls of the cavity and with a wedge-shaped instrument, are wedged against the walls of the cavity, another pellet is placed in the central opening and that in time is wedged into place. This procedure is kept up until it is impossible to wedge any more gold into the cavity, when the mallet is applied thoroughly all over the surface of the filling, and a dense, compact and impermeable filling is the result. This method may be varied, as it often is in my hands, by finishing the central fissure after the non-cohesive foil has been wedged to place with cohesive foil. The only advantage in doing this is that sometimes it is a little hard to get the last wedge of soft gold down to place nicely, but it can be done if persisted in. I am by no means an expert in the use of non-cohesive foil. I am only a very humble disciple, willing and anxious to learn all I can about those things that concern our profession, and if my paper shall stimulate an interest in the subject, you may handle the paper and its author as roughly as you please. Still, I shall have gained my point and I shall be happy.

DISCUSSION ON DR. CONZIN'S PAPER.

Afternoon, September 2, 1902.

Paper of Dr. J. V. Conzett, "Non-Cohesive Gold," discussed as follows:

Dr. Clack:

Mr. President, Members of the Northern Iowa Dental Society:

If Dr. Conzett felt some embarrassment about getting up here and speaking on non-cohesive gold by reason of Dr. Wedelstaedt having covered the ground so fully previously, you may well consider my position. After Dr. Wedelstaedt has covered the ground, and then Dr. Conzett has picked up all the little crumbs of information that might have been left, I am called on to——What? (Voice from audience) "Rub it in."

These gentlemen have gone so far beyond anything I can do in that line that I can only say that so far as my experience goes with soft foil in the places indicated for that, for the places where it should be used, there is nothing its equal. Take its non-conducting qualities; there is a difference; I am positive; I have been struck with that. When I first began inserting those fillings and would get them gingival, extended up so far I was pretty close to ductation, I would think, well, that poor woman is going to feel heat and cold, and still when I asked them afterwards "Why, yes, a little." I didn't understand it for quite a while, not until Dr. Searl said that was supposed to be one of the reasons.

Then another thing, the size; the saving of time to the operator. Very early in the week, in order to come down here, I was obliged to work hard, and one operation I made was in the first molar. I put in nine sheets of foil, but three and one-half sheets of that was soft foil, and by my assistant's watch I put them in in ten minutes. Now those of you who have put in those fillings with the ordinary foil can imagine how much backache and eyestrain I saved myself. Then another thing; I had planned to put in nine sheets of foil that we ordinarily use, and could make the fillings as cheaply for the patient, and while we can take the economical side of it ourselves and get more for our work, doing this class of work, we can nevertheless make better operations for our patients, at less expense to them, without detracting from our earnings. I know it is going to be a long time before we can insert those cylin-

ders the way Dr. Searl does, and the way Dr. Wedelstaedt does, but I believe I can see each time a little improvement. There is one thing I hope they will bring out; I am not sufficiently familiar to illustrate it, but those of you who have seen those cylinders placed in the gingival will probably understand when I say after you have condensed them toward the axial wall in crowding it out toward the margin of the cavity sufficiently to imperil the cylinder tipping, then start back with your cohesive gold, start in and crowd it over, and as you go down to the gingival portion to that soft gold and keep plying over there, and plying over, you will pretty soon get to the margin where you have it condensed, and by that time you have that wall of hard gold so perfectly tied to the ends of those cylinders toward the axial wall of the cavity it is almost impossible to tip them out, and as you go over there each successive time you impinge the way further on the soft gold and it will come down a little further as you go toward the edge of the cavity so that your hard gold will reach and clutch your soft gold, tending to hold it in instead of dropping it out.

And I wish every dentist here would go home and try these methods. Come next year and let us hear what you think about it, and see if everyone of you cannot have something to tell us.

DR. MARTIN: I wish to say, following Dr. Clack's remarks, that while I have not had the experience of trying these methods, I propose to have (applause), and I hope that I may have something to say if I am privileged to come to this meeting another year.

I am sure that I am favorably impressed with the descriptions given, and it seems to me that the claims made are reasonable, although I apprehend difficulties, and I am inclined to think we will find difficulties that have not been sufficiently detailed in the explanations given.

At the same time, if we are able to perform better operations, in less time, as Dr. Clack states, it is the sort of thing we want to know about and to practice.

DR. BREENE: When conversation turns to non-cohesive gold I feel I am somewhat at home, for I lived six years in a territory where they used non-cohesive gold six days in the week, and every hour in the day. During that time I learned something about its qualities, workings, and its value, and I want to indorse every statement that has been made about its good qualities.

It is not only a time saver, but it is a tooth-saver in the instances to which it is suited. It is not only as good as any other

material which can be used, it is better than any other, and a fairly good operator can make better operations with non-cohesive gold than he can possibly do with cohesive gold, and he will make better ones than even a skilled operator will do with cohesive gold. That sounds like a strong statement, but it is a true one. Students have been able to master the intricacies of non-cohesive gold in far less time than cohesive gold. They have been able to do better work; to do it quicker; to the better advantage of the patient. That is a test, if a beginner can use it. Just by the way of calling your attention to the fact that there is some literature upon this subject there is a series of articles in the Items of Interest for the year '97, not by consecutive months, for it is scattered from March, I believe, along to October, but there are five months of '97 that contain a series of articles upon that subject, and illustrated beautifully, as I happen to know, for I made some 75 illustrations that were used.

I find some facts in addition to those that have been given here, nothing in contradiction of anything they have said, but in addition, some features which they have not mentioned, and which will be useful to you.

I am not at all expert in the use of non-cohesive gold, and yet I have many a time filled where it took from two to three sheets of gold in ten to fifteen minutes without any hurry. I mean I have inserted the gold after I had it ready without any hurry at all, and I have made better fillings than I possibly could have done with cohesive gold. It is THE MATERIAL. I have filled when I have got in a hurry two sheets of non-cohesive gold in less than ten minutes; if everything was favorable I have even filled cavities in less than ten minutes—in five minutes, but the saving of time is not the thing; it is the saving of the tooth.

You can afford to do your operation for less money than you can the other way, and you do it easier to yourself, and at the same time know you are doing your patient a better service.

A word to the ones who propose to experiment. You must not expect that the first time you do this or try this you will have your best result. You didn't make your first plate in a hurry, and you didn't make it as satisfactory as some you have made later, nor your first filling, nor your first crown. You didn't take your first step when you were learning to walk with as much confidence as those you have taken later. If you can get number two tin foil (it is a little hard to get) it has almost every working quality that ordinary number four non-cohesive foil has, and you can practice to your heart's content with this, and it is considerably less ex-

pensive than using the gold. You will find when you have used the two materials that the advantage is that the gold is just a little easier to use than the tin foil.

DR. MONTFORD: The term non-cohesive gold has always been a "sticker" to me. Now, Dr. Clack talks about soft gold, Dr. Conzett talks about non-cohesive gold. What is the difference?

(Dr. Breen: They are the same thing.)

Now take Watts gold; that is very soft and it is very cohesive. Is that the same thing?

Dr. Wedelstaedt does not use the term soft, he uses the term unannealed; that suits me better. Then I know what it is; but about non-cohesive and soft gold, I can't agree with you that they are the same thing; I don't believe they are.

Now, in regard to filling these cavities; I am very much pleased; I have learned a great deal; I am not very young, but I am not too old to learn. And I hope I never will be.

I am commencing to place the gold in the cavity, as was demonstrated this morning, placing the cylinder in the angles, do you expect to have any cohesion between those cylinders? Absolutely not.

DR. CLACK: I had a talk with Dr. Wedelstaedt on just what holds the gold in the molar square bottom. There was a dry goods box that was standing on the sidewalk, and the doctor walked up to it and said: "There is a perfect cavity preparation. Flat base, square sides, filling can be put in there that will stay to all eternity."

But to answer your question: We believe if you noticed it this morning that the cavity preparation was in linguial axial and in the labial axial angles and then that other mass coming on gives you just the least little retention. Then that other comes on top of it. There is no cohesion.

DR. BREEN: Non-cohesive and cohesive soft gold; there are just as many names for the different manufactures of gold as there are manufacturers. The same thing is given a different name by different manufacturers. S. S. Whites label a gold which they produce and which is fairly non-cohesive—they label it soft or non-cohesive; but as you take it out of the box it is fairly non-cohesive. John Hood manufactures a gold which he marks as non-cohesive—not soft at all; it is just as soft as the other. You can transform it into cohesive gold. There are others who label their gold soft when they mean semi-cohesive. There are others who label it soft when they mean non-cohesive. A non-cohesive gold is a gold which does not become cohesive by heating. There are but two made by John F. Abby—there are a number of others

which are labeled non-cohesive; the label makes no difference; it may be labeled soft or non-cohesive and it may do fairly well. S. S. White's new standard foil as you take it out of the box is fairly non-cohesive; if you put it under hydraulic pressure it will cohere. In non-cohesive gold we make use of an entirely different principle than we do in cohesive gold. We make use of the principle of cohesion of one particle to another. Your plugger, whatever you use, is the blacksmith's hammer, and the material is forced together by virtue of its cohesive properties. You weld one on to the other and make it any shape you please, long, round, or any shape. Weld it into the cavity and therefore you can get it into a larger hole. With the non-cohesive gold you want to avoid every trace of cohesion or you lose every benefit of the non-cohesive qualities. Non-cohesive gold is the proper term; soft gold is an improper one.

DR. BROWN: I feel that I want to say something and I do not want to be misunderstood in saying it, but I want to utter just one word of caution. I want to say to all, "Don't go too fast in this thing." Now, in saying that I don't want to be misunderstood. I suppose no one of you appreciates so much as I do the benefits of these principles you have seen here shown so very beautifully and clearly, and I believe, as I said to one of your members the other day, that for every man of twenty or more years of practice who takes this matter up, or has taken it up and has familiarized himself with the information, who has learned these principles thoroughly, and re-adapted his methods, has added probably not less than twenty years to the best usage of his practice. But at the same time I have seen good operators absolutely ruin their work; today it is not worth that much (snapping fingers). They have gone to confusion with this proposition of trying to crowd that gold in. They have tried to get too much gold in too fast, and whatever kind of gold you use you want to remember that you have got to do it carefully, that when you leave a piece of that in a cavity you must know it is just where you want it, and you must know it is going to stay there. It is all right to work rapidly; it is all right to have your dry goods box proposition, which is correct as far as that is concerned, but you must remember when you try to make dry goods boxes in the mouth you must take into consideration several things besides the dry goods box. The rays of light are changed in their direction by many things; the rays of light in your office, shining in the mouth of the patient, in the morning will be very different from the rays in the afternoon; they will be very different upon a dark day from the rays on a

bright sunshiny day. Very few people are the same at all hours of the day, but become more or less fatigued at the end of the day. I promise you you can't make a box-shaped cavity in the morning and do the same thing in the afternoon and do those two things perfectly. You can't do it. Now, what does that mean? Does it mean that the principle is not right? It doesn't mean that the box principle is not right; that is the ideal form of a cavity, I grant you. But it means that you cannot make a perfect box cavity in the mouth of all people, on all kinds of days, in all kinds of physical conditions. So what does that mean summed up? It means this: Just make it and be *sure* of yourself. Work your gold as fast as you can, but be sure of it as you go along. You won't see Dr. Wedelstaedt or Dr. Searl doing anything that is not all right; they are sure as they go; and they have been working at this for a great many years. Don't you undertake to go any further than you can go and do it right. Don't begin to pride yourself in putting gold away in so many minutes. That means ruin as sure as there is a God in Heaven. You can't get away from it. Just the moment you begin to have that idea uppermost in your mind, you have started on the down track. Surely I grant you that as you follow these methods, as you become accustomed to handling these cylinders, each time doing it a little easier, each time a little faster, but let it come in that way, and don't try to make records and report how much you have put in in a given time, because if you do, some other fellow will be telling how he put it in before long. I want to say this just as a word of caution, and I want to repeat it with an appreciation of the value of all these principles, but I believe that if you are trying to make a cavity and you feel perhaps that you are not going to do any harm by employing these principles, you can just do a little something to be dead sure. If you can put away so many sheets of gold in ten minutes, it won't do any harm to take fifteen minutes, and you have just five minutes to be sure of it, and that five minutes will mean more than five years in the life of that filling.

DR. CONZETT (closing the discussion): I am more than pleased with the discussion which this paper—if I may designate it by that name—has brought out. I am glad of the interest which has been manifested by the Society in soft or non-cohesive gold.

The element of time, which Dr. Clack has spoken of and which Dr. Brown has cautioned us against, and very worthily done—it was a word in season, I believe,—the element of time, however, does enter into the consideration of our work, and the use of non-cohesive gold is a great time-saver; there is no

question about that. We can save time in our fillings, and do it legitimately, and it is better for us. It is so much better and easier after one becomes accustomed to the use of it—it is so much easier to use the soft filling than it is to attempt to build up with cohesive gold, and those who have attempted to put in large quantities in the molars, second and third molars, either above or below, know what a back-breaking job it is, and with soft foil it can be done better and in much less time than with cohesive gold.

Then, another point. Dr. Brown has given us a caution. The trouble is, you know, that a man may bring an idea, a something which he has been working on, something with which he has been successful, and some one else take it up and make an absolute failure was almost impossible—was impossible for me, it might not have been for others—to replace a rubber band upon a tooth, and I have been able to fill that tooth by non-cohesive foil, where I could not have done it if I had used cohesive foil. And in that place it was of untold benefit to me.

I am almost afraid to bring that instance before the Society for fear some one else might try, and make a failure of it. It will be successful in the hands of the one who will follow the proper principles, and use care in placing all their cylinders.

The difficulties Dr. Brown spoke of—and I am glad he did—the point Dr. Montford brought out—he asked if the cohesive foil would adhere to the non-cohesive foil. It will not, and there is one of the greatest difficulties which we must overcome, and we must discriminate in the use of soft foil; we must know where to put it and not run wild, nor seek to place it every place. I was considerably impressed and chagrined this morning to see a filling which I placed in a tooth fall from Dr. Clack's mouth when Dr. Wedelstaedt was polishing it, but I attempted to use soft filling in a place where I had no business at all. I had been using soft foil and I put it in a cervical, where it had an insufficient anchorage, where I should have used cohesive foil. The cohesive foil parted from the soft foil, and the filling dropped out. In this place you want to let soft foil alone, as I found out this morning, and as you were told afterwards. Be very careful where you use it, and know where to use it properly.

It has been spoken of as a great tooth-saver. It is undoubtedly a tooth-saver because of its adaptability to a cavity, and the thought came to me while Dr. Brady was speaking of its qualities as a tooth-saver—I wondered if the animal gas placed upon that had any effect at all? Would that have anything to do with it at all?

DR. BREEN: It does seem to have some seeming effect in that way at least; I cannot say positively that it does, but the non-conducting qualities have been noted by many men although it is exactly the same gold.

DR. CONZETT: I wonder if the gas condensing upon it might perhaps have some effect? I do not know that it does. Dr. Montford spoke of unannealed gold in contradistinction to soft gold; if the gold were not unannealed it would be, would it not, more nearly as it goes from the gold beater, it would be hard. All pure gold, all pure gold is soft. I am glad this subject has come up for discussion, and before I go I want to express my appreciation of the good this Society has done me, and I thank you all for your courtesies which you have extended to me. Goodbye.

THE NECESSITY FOR USING MORE INTELLIGENCE IN TREATING DISEASED CONDITIONS OF THE PULP.

**Read Before the Northern Iowa Dental Society, September 2-3, 1902.*

BY A. C. SEARL, D. D. S., OWATONNA, MINN.

Mr. President, Ladies and Gentlemen:

Permit me to open my remarks by saying that only a few complications of the pulp can be dealt with in this paper. To attempt to interest you in the different diseased conditions of the peridental membrane would mean that I should have to take the lectures on Special Pathology and read them all to you. We are not here for that purpose, but rather to get the most good out of a discussion of the remarks I shall make in considering a few of the diseased conditions of the pulp with which we deal.

For the past ten years our attention has been called repeatedly to the necessity for using more intelligence when treating these diseased conditions. Notwithstanding all that has been written, all that has been said and the importance of this subject, the great majority of the men in our profession are still following the obsolete methods. The time has come and is right now, when I, for one, protest against this matter of not using the rubber dam in any and every case where it can be applied, against this matter of using cotton and sandarac varnish as a temporary filling and I protest and that still more strongly regarding this matter of not making use of the knowledge which has been developed for us when dealing with the different complications of the pulp that we are called on to treat. I speak thus strongly regarding this matter for a number of reasons. First, I know from a bitter experience

what fearful results have followed and are likely to follow where the greatest attention is not given this subject. I do not only believe, but I know precisely what I am saying to you. Second, I wish, if possible, to interest you in this matter so that greater good can be rendered those whom we serve. And, last of all, let me ask you and let each and every man within the hearing of my voice ask himself, Is it my duty to give the best that lies in my power to those who consult me? Do not these patients come to us expecting the best? They pay us our fees, do they not? Then I hold it is our duty to give them the best that can be obtained and that is in our power, yours and mine, to render them. You will pardon me for opening my essay in this manner, but my heart is in this work and I wish to lead as many out of the dark and into the light as I can. I can say truly to you that it is not so many years ago when I was taken by the hand, so to speak, and led from the darkness into the light. From that time to this I and my patients have had the greatest satisfaction that they have had in over twenty-five years of practice.

There is probably no operation that we are so often called upon to perform and that is attended with so much uncertainty, anxiety and many times of so much importance as is the treatment and filling of root canals. In conversation with different members in our profession upon this subject, there seems to be such a great diversity of opinion and methods regarding what is scientific and what is not scientific that I thought some good might be accomplished if I cited two or three cases, their conditions and treatment from the time the patient first consults us until the root canals are filled. I wish if I can to interest you a trifle in this subject to the end that some good may come to us all. I claim no originality in what I offer, but the results are based on observation, reading, practice and conversation with other men. A patient consults us regarding the condition of an upper right first bicuspid. The patient complains of this tooth feeling longer than the rest, that it is loose and sore to the touch. The patient did not sleep much the night before, so we conclude that we have a dead pulp to deal with. On examining the tooth we find a large cement filling in the mesio-occlusal surface. The patient further says that the tooth had given some trouble prior to its being filled, some two or three years previous to consulting us. Since it was filled with cement it had not given any trouble until within the past two or three days. The teeth and gums on that side of the mouth are washed with alcohol or some other antiseptic. The rubber dam is then adjusted on the central, lateral, cuspid, first and second bicuspids and first molar.

The exposed crowns of the teeth and dam are now washed with alcohol, as a precautionary measure against any possible outside infection. When this is completed an aseptic spear-pointed drill is placed in the dental engine hand-piece and the filling removed. As was expected, the filling was made on a mass of soft decay, in fact this pulp was capped. I have long since abandoned the hope *exposed in children's teeth,* but *I do* NOT attempt to cap an exposed pulp where that exposure is made from the removal of soft decay from the cavities. I know that the results are much more satis- of saving exposed pulps in this condition. *I do cap pulps that are* factory where the pulp is destroyed, removed and the root canals filled, than where it is allowed to die under a filling that is made on a mass of soft decay, the dentinal fibrils gorged with disorganized matter and the peridental membrane subjected to constant irritation therefrom. In such cases as I have just cited I destroy the pulp and fill the root canals at once. Now let us go back to the first case mentioned, this case of the bicuspid with the cement filling. I remove the filling, then I take a large rapid excavator or discoid, remove the decay and find the pulp dead and disorganized. I wash the cavity and pulp canals with just as hot water as the patient can bear, then dry the cavity and flood the same with white oil of cloves. Then with a broach I coax or tease from the canals all the remnant of the pulp possible without forcing any of the septic matter into the apical space. Greatest care must be exercised in doing this special part of the operation. I believe that just as much and more depends upon the mechanical cleansing of the root canals as depends upon the medicinal treatmeant, for the reason that the dead pulp is the irritating cause and without its removal the results that we wish cannot be obtained. Now let us go back to this case again. After removing all of the dead pulp that we can the canals are as thoroughly washed with hot water as is possible. The canals are then dried and filled with the white oil of cloves and dressed with a single wisp of cotton. If any surplus oil of cloves remains in the cavity of the tooth it is removed and dried with alcohol on a pledget of cotton. The cavity in the tooth is now moistened with the oil of eucalyptus and filled with pink gutta percha. This I feel should be carefully done, as everything depends upon the exclusion of the saliva and the micro-organisms with which it abounds. I believe the slovenly, half-hearted way of filling the cavity in the tooth with cotton and sandarac varnish is a thing of the past, so far as this relates to the intelligent and progressive men of today. Another thing. How absolutely absurd is the idea that the filling at this point should be punctured to give

vent to any accumulated gas, for most assurdely where gas could escape micro-organisms could invade. After filling this tooth with gutta percha the patient is dismissed for twenty-four or forty-eight hours, with instructions, however, to return at once should the trouble recur. But the trouble does not follow, provided the treatment has been made as I have stated. At the end of this time, on the patient's return, the root canals may be permanently filled.

Now for brevity let us assume that when we opened into this bicuspid the body of the pulp was dead, but that portion of the pulp remaining in the apical third alive, quite sensitive to the touch of the instrument and we had some hemorrhage. Where such a condition of affairs exists, I should use the hot water just as stated, flood the cavity with white oil of cloves and, after waiting a few moments, dry the cavity and use aromatic sulphuric acid. I should remove the remaining portion of the pulp, cleanse the root canals as thoroughly as possible and fill the canals at that sitting. This method I have followed for so long a time and so often, and have yet to have the first patient return and complain of pain, that I give it you as a good method to follow. And now let us assume another condition. Suppose that upon opening into this tooth or even before, we suspected there was a pus pocket at the apex. If this existed I should try and drain the pus through the tooth. By following this method there would not be the liability of giving trouble by forcing septic matter through the apical foramen, for it would be drained out with the flow of pus. Suppose there was a pus pocket in the apical space and that it would not drain, in other words, the apical third of the root canal was filled with diseased matter, if I could not get my broach into the apical space I would flood the canal with aromatic sulphuric acid and enlarge it. I should then drain the pus from the pocket, thereafter use the hot water, cleanse the root canal, dry the cavity, removing all the moisture that I could, flood the root canals with white oil of cloves, dress the canals with a single wisp of cotton and just as before, fill the cavity in the tooth with gutta percha. The patient would then be dismissed for a week or ten days. At the end of this time, upon the patient's returning, the rubber dam would again be adjusted, the filling in the cavity of the tooth removed and then if I found the dressings dry and free from odor, I should permanently fill those root canals. If the conditions were not favorable for filling the canals of the tooth, they would be treated just as before and the patient sent away for another week, but this is seldom necessary, for with the removal of the cause of the irritation, the parts will readily heal.

Often in multi-rooted teeth it is necessary to treat each canal as a separate condition, for the conditions existing in each root canal may be different. Now, gentlemen, this is not theory or stretch of the imagination. It is a veritable fact. For instance, let us take an upper first molar with a cavity of decay upon the mesio-occlusal surface and extending well to the gingiva and nicely filled with gum tissue. This gum tissue is so hypertrophied that it readily protects the pulp from all ordinary irritation, although no use can be made of the tooth in this condition. After preparing the teeth and gums for the application of the rubber dam, the dam is adjusted and thereafter the hypertrophied gum is removed. Upon opening into the pulp chamber we find the body of the pulp gone. On further examination we find the lingual root canal filled with a solid mass of light colored cheesy matter. This is removed en masse from the canal. After various attempts the opening into the mesio-buccal root canal is not found. In the disto-buccal root canal we find a considerable amount of sensitiveness and the apical half of the pulp very much alive. In fact there is quite a hemorrhage from this canal. Now what is to be done? The lingual root canal would be treated with hot water and after drying, it may be dressed with some passive remedy. I prefer the white oil of cloves. The portion of the pulp remaining in the disto-buccal root I remove and I fill that canal permanently at once. We must take time to find the opening into the mesio-buccal root and perhaps call to our aid aromatic sulphuric acid. So many conditions of the kind I have just described to you have come to me and have received just such treatment as I have here outlined that I felt it was of greatest importance to say to you that it is often necessary to treat each root canal as the root canal of an individual tooth.

In calling your attention to the various conditions of diseased pulps that come to us for correction, I feel that I have said enough to lay the foundation for a good discussion of this subject. In the few minutes allotted an essayist for the reading of his paper, I feel that he cannot say everything that pertains to this subject. I have simply called your attention to a few of these conditions as they occur in my daily practice and have given you my method of restoring them to a condition where nature can do the rest. Now each man has his own method of treating these different conditions. I have given you in detail what I do. Now will you be so kind and tell me what you do with these conditions? Remember, while you are doing this that we are here to learn and unless we have an interchange of opinion and ideas, nothing is gained.

In closing let me say that the general tendency of the times is

constantly towards simplicity and this simplicity is invading every department of life. If you will but examine the reapers, the mowers, the rakes and every class of machinery that is at present on the market and compare them with those made twenty years ago, a person is all but appalled at the former monstrosities and, gentlemen, they were monstrous things. Now what has brought about this change? Simply the development of knowledge. Man has taken advantage of that knowledge as it has been developed. Let us be alive and up-to-date. Let us also take advantage and make use of the knowledge which others have developed for us, especially as it relates to employing these methods in our daily operations.

THE MODERN AMALGAMS.

Read before the Northern District Dental Society of Illinois, at Rock Island, Sept. 23-24, 1902.

By Garrett Newkirk, Los Angeles, Cal.

Sometimes I marvel in looking over the journals that appear from month to month, not so much at things new, but at the never-ending repetition of things old. I suppose it will never end, probably ought not to end, and yet to some of us occasionally it seems a bit tiresome. But it is in harmony, nevertheless with the general order of things that come and go.

Thoreau wrote some fifty years ago of news and newspaper: "I am sure I never read any memorable news in a newspaper. If we read of one man robbed, or murdered, or killed by accident, or one house burned or one vessel wrecked, or one steamboat blown up, or one cow run over on the Western Railroad, or one lot of grasshoppers in the winter, we never read of another. One is enough." As to foreign news he says: "I seriously think a ready wit might write a twelvemonth or twelve years beforehand with sufficient accuracy. As for Spain, for instance, if you know how to throw in Don Carlos and the Infanta, and Don Pedro, Granada and Leville, from time to time in the right proportions, and serve up a bull-fight when other entertainments fail, it will be true to the letter, and give as good an idea of the exact state or ruin of things in Spain as the most succinct and lucid reports under this head in the newspapers. If you have learned the history of crops for an average year, you never need attend to that thing again, unless your speculations are of a merely pecuniary character."

On April 1, 1901, some young friends of mine played this joke upon their father, who is himself the proprietor of a newspaper. They secured a clean copy of a daily, two months old. This, neatly folded,

was placed in the usual place where he received his morning paper. He opened it and read therein for ten or fifteen minutes, till his eye happened to strike the date. The children, meantime, had been nearly suffocated with suppressed laughter, that was only equaled by their screams when he "caught on." There is a good large lesson in this incident that needs no explanation. Perhaps the moral would be to always look at the date before you read.

And yet I cannot but think that a universal custom like the printing of daily news, and weekly comment, and monthly expressions of opinion, must have some reason for being, based on the needs of mankind. Of one thing we may be sure, a great many people are getting plenty of exercise in the making.

This may be the only plausible excuse I can offer for the present paper on the old, worn, threadbare subject of Amalgams. I have no hope of being able to dress the old thing in new clothes. If I can darn one hole in a sock where a toe is sticking out, 'twill be enough.

We all know how recent is our knowledge of the facts about amalgam for the filling of teeth. We all know that for whatever ideas of accuracy we possess, we are indebted mostly to the careful investigations of one man, whose name is G. V. Black. We know, too, that the initial move in this work was suggested by a discussion which took place in our Illinois State Society, at Galesburg, about seven years ago.

Notwithstanding the fact that the amalgams had been serviceable in a large measure for half a century in the saving of teeth, it is a truth to be remembered that until very recently their characteristics were uncertain and apparently ungovernable. No one knew why one differed in its properties from another or why the same preparations or "make" disagreed with itself under varying conditions.

But now, while all is not learned that may be perhaps, enough is known by intelligent makers to insure a degree of certainty and reliability for their products. We have now a confidence that is definite as to what we may do with them. If good results are wanting in the future, the fault will be our own, dependent on bad manipulation.

It is idle in this day to disparage and cry out against the use of amalgam. It has a field of its own and it has "come to stay." The man who knows where and how to use it can accomplish therewith a great amount of good.

CASES ADAPTED.

Cavities in any surface not conspicuous, where the patient is financially unable to bear the expense of gold, may be filled with amalgam. Teeth so badly broken down as to make the use of gold impracticable, teeth that are often unwisely cut off and replaced with

gold crowns, so long as there is a body of tooth substance sufficient for anchorage and support, these may be built up and made for a long time serviceable with our improved amalgams. It is justifiable in some cases to use it in labial as well as buccal cavities of the lower teeth, also in lingual surfaces of the upper incisors.

The use of amalgam is justifiable not only in the interest of the patient, but to save the strength and nervous energy of the dentist himself. We have had noble men who courted an early death by the daily strain of difficult gold operations.

Some are doing the same thing now, and they ought not. No man has a right to imperil his life or health to carry out a theory of ideality with regard to disto-occlusal fillings in molars and bicuspids. He can find room enough for self-sacrifice without that. And it is a fact that unless a difficult gold filling is inserted with the greatest care, and without stint of nervous force on the part of the operator, it is worth less for the saving of the tooth than a good amalgam filling in the same situation. And it is a further fact that when the operator may be weary and suffering from over-strain, or when he cannot depend upon the self-control and steadiness of his patient, he simply *cannot* do his best with the difficult operation. In such cases, uncertainties and deficiencies are sure to find place.

In the anterior teeth certainly, with rare exceptions, the use of amalgam is contraindicated. Gold, or platinum-gold, or porcelain or the cements are demanded for esthetic reasons. Beyond that the rule becomes flexible.

When conditions so combine as to favor gold, well and good. If operations can be borne by the patient without hardship, physical or pecuniary, and without undue strain upon the operator, well and good. There is satisfaction to both parties, and, with the dentist, a goodly share of commendable pride in the results achieved.

But the demand for gold is not imperative. Amalgam has license in this field. For certain purposes and in extreme cases our newer preparations fill a place that were otherwise empty. Broken-down roots may be restored often in preparation for gold crowns. Deep cavities extending rootward, cavities in roots denuded of their bony covering may be filled well and quickly. Spaces may be bridged by extensive contours. The basal half of large cavities may be filled with alloy and the remainder with gold. The result of a combination being oftentimes better than could be had with either material alone.

CHILDREN'S TEETH.

And our later non-shrinking amalgams are well adapted to the preservation of deciduous molars, and also of the first permanent

molars. The often-heard statement that "Amalgam cannot be depended on in childrens' teeth" no longer holds good. Employed with the same degree of thoroughness that is necessary elsewhere, it becomes the *sin qua non* of this line of practice.

One year ago a physician spoke to me about the teeth of his little daughter, three years old. He was quite distressed that all of her molars were badly decayed upon their occlusal surfaces and so sensitive that the child avoided using them. She was forming the habit of bolting her food and suffering from consequent indigestion. The occlusal faces of several were almost entirely broken down. It was evident that plastering them over with cement would be but a temporary makeshift. By patient effort, attempting but little at any one sitting, I was enabled to prepare those surfaces in a manner to hold amalgam. The oral condition has been comfortable ever since, and the fillings have not yet needed any addition or repair. The new amalgam has been of invaluable service to my young patients, and given more comfort of mind to me than any other one addition to our armament that I can think of. But the newer amalgam will not work for us unless we do our part. Next to gold it is high-toned and particular. It will tolerate no slight, either in handling or cavity preparation. Let no one suppose that he can use it in the same old easy way with which practitioners mixed and "stuck in" samples of the ancient sort.

PREPARATION OF CAVITIES.

The essential principles and the general rules for the formation of cavities for amalgam are the same as for gold. If a builder were choosing a stone for the foundation of a pillar or an arch he would not take a round one, nor would he dig a round hole. He would know that the broader and more nearly flat the base the more reliable would be the support.

So it is with the base of restoration—the new building, the addition to a tooth. The word "filling" is incomplete to express the true idea in this connection. We *rebuild*, as if we were restoring half a house or a broken monument, the new to join perfectly with the old; and strong, to bear the stress of storm and time. It would be well if we could quite rid ourselves of such terms as fillings and "stoppings," which are little better than *"stuffing."* It is restoration, reconstruction that we make, for that which has been broken away.

Nearly all students and many young practitioners have the idea—some are never able to rid themselves of it—that an overhanging wall or deep undercut is necessary to hold this building. They simply will not cut back, and *down, down,* to a good foundation, not if

you stand over them "with a club." They fancy that the thing must be in some way propped up. Which reminds me of the incident of an old farmer and his house, out in Illinois, nearly 50 years ago, when I was a "barefoot boy."

He had built a small house, much too high for its width—under the persuasive influence of the gentle prairie zephyrs the house leaned to the rising sun. So the old gentleman went to the woods and got some black oak poles to prop the corners. But these soon rotted, and he had to make a "lean-to" to brace up the main part. This is what we have to do often, make a lean-to for the support of a toppling house; we can't depend on any sort of weak props, neither black oak nor shells of enamel.

I believe that a foundation properly shaped for a building with gold is good enough, just about right for amalgam. The margin may be beveled a little more for gold, perhaps, but not much. The edges of the new amalgam stand well, especially in places where they are not subject to direct stress, and that is anywhere except on the occlusal surfaces.

Of course it would be idle to say that any filling will be a cube, but there is something in nearly all which suggests that form. Take for example a simple occlusal cavity in a molar tooth. There is, first the base, then four walls, mesial, distal, lingual or palatal, buccal, five in all. The body of the filling then when complete is somewhat cubiform, five sides, determined by the cavity, form the sixth by the finish of its own occlusal surface. It follows then that the force of insertion, to secure perfect results, must be directed in five directions, viz., the base and each of the four lateral walls of the mould; and it follows that wherever a wall may be missing, as in every compound cavity, we must have a substitute therefor, mechanically applied. This substitute we denominate a matrix. I maintain that for amalgam filling (and we might include the cements as well if they were under consideration) in compound cavities, the matrix is indispensable; and no student should be permitted to make such a filling without it. The form, the mould, must be complete, except at the one open end of insertion.

What is the best matrix? That depends upon conditions present in any given case. Sometimes a very thin steel blade, with a hande (much like a "sickle" scaler) is available. This anyone should be able to make for himself. It can be made very thin and very tough by persistent beating with a hammer. It has the disadvantage of requiring the use of one hand, and if the patient moves his head the matrix is hard to keep in place. In many instances where a complete band matrix is admissable it is well to make one

for the special case in hand; as, for example, where disto and mesio-occlusal cavities are connected.

But the ordinary band matrix that one finds on the market is not the best. It is wrong in the principle of its construction. The most one can say of it is that it may be better than none. It is not adapted to the true restoration of tooth forms. It has the same fault as the gold bands which so many put over the crowns of line teeth, that inevitably must fail of contact at the necks of those teeth. The band matrix, too, has the disadvantage of requiring the next interproximate space for itself, where we do not want it at all, and where it is often difficult to insert. The ideal matrix is very thin, tough, flexible, adaptable to margins, easily inserted, and removed, and occupies but one interproximate space.

The one form of matrix and holder that in my experience meets every requirement in the large majority of cases, is the *Ivory.* I would certainly pay the cost of one many times over rather than be deprived of it.

As a rule, I do not believe in the use of a matrix for gold, but I repeat that it is indispensable for all compound fillings of amalgam.

PREPARATION AND INSERTION OF AMALGAM.

Unquestionably, the best way of mixing is by weight, in the proportion of 7 of mercury to 5 of the fillings. Practitioners of long experience obtain good results by the old-fashioned method of hand mixing and pressure, there is no doubt of that. But if one is determined on the best results he must take the time and trouble to weigh the materials, and they must be thoroughly incorporated together. Again, the older practitioner will do this quite well with finger and palm, but not so thoroughly as he could in a mortar. He often makes up in a way for his imperfect mixing by vigorous burnishing of the filling during its introduction.

WHAT ALLOY?

I shall not say that any special brand is better than all the others, But I *do think* that one should select a reliable make and stay with it. By learning the special working qualities of one preparation he acquires a skill of manipulation, not possible to him who experiments with many.

We all know that there are cases where the use of the rubber dam is well nigh impracticable, but they are truly exceptional. The rule must be to *use the dam.*

With this in place, and the matrix, we will suppose of a large compound cavity, the alloy is made ready. It must be inserted as

quickly as may be, but with thoroughness. Only a limited quantity should be inserted at the first, one-fourth or one-third, perhaps, of the mass, and this condensed at the bottom and along the margins with an instrument that is not too large and coarse—one that may be applied directly at these points. The burnisher is *not* the instrument to use at this first stage of the filling; the end of the instrument should be square, not round. Unless hand pressure is very strong indeed, I am convinced that better results are obtained by using the mallet. More material will be used for a given filling—it will have more weight and density. Before the first stage of filling is completed, the material left has already hardened a little, and must be reworked, briskly, with thumb and finger or by finger and palm, till it becomes flexible, and from the warmth of the procedure glistening with an increase of mercury upon the surface. The second part of the mass may be inserted and burnished to place or a larger flat faced plugger may be used again with the mallet. By this time, with the cavity half or two-thirds filled, the remainder of the material may be too hard for use, unless one adds a slight amount of mercury and regrinds in the mortar. But this is not desirable. It is better to prepare a fresh mass without weighing, squeezing the moss thoroughly through a strip of muslin. After this, if under the influence of a warm burnisher the surface seems to be too mercurial, an excess of fillings may be added to the last portion used.

When completed, the ideal surface is very hard, and gives forth a squeaky note under a smooth burnisher that amounts to a final certificate of character. Now let the surface have a "cotton" finish; a firm roll of cotton, cottonoid or lintene held by stiff plyers being the instrument.

If the matrix has been of right form and adaptation, very slight trimming will be needed to restore practically the original form of the tooth. The pressure used in the introduction of the filling will have forced the teeth apart, at least to the extent of the thickness of the matrix. It is well that this should have an oiled surface to facilitate its easy removal, and the removal may take place at once, by gentle manipulation when the filling has been completed.

Before removing the dam, caution the patient against quick or forcible closure of the mouth. See to it that no cusp or an occluding tooth strikes too sharply on the filling. Where the cusp is extra prominent it is sometimes better to grind away part of it, rather than hollow out the filling, notwithstanding the oft suspicion of the patient that the tooth may decay—at a point where it never does.

For removing any excess of filling at the point of occlusion I have never found another instrument quite so satisfactory as a small vulcanite scraper, No. 1, the reverse, convex side of which may often be used for a burnisher. The next step is to go carefully over the edges with a thin blade burnisher; then any overhanging flakes of amalgam should be removed with a knife-like blade, that will shave but not roughen the edges of the filling. The *contact point and the region round about it should remain untouched* for an hour at least, usually till another day. Then a Perry separator should be employed, and only fine tape used for polishing the approximal surfaces; and again the contact point must be left alone, or only polished to conform with the adjacent contour.

The occlusal surfaces, having been smoothed with small cuttlefish disks, moosehide points and pumice, the operation is done; and so done that it will not reflect discredit on any operator, however humble or however eminent.

COMPENSATION.

Who shall say that an operation which is really a series, involving oftentimes previous separation, not infrequently preparatory treatment and a temporary filling with gutta percha, as careful shaping of the cavity as for gold, the adjustment of a suitable matrix, painstaking manipulation of material, attention to occlusion and points of contact, and lastly good polishing again using the separator; *who shall say* that this is not worthy of compensation according to time and skill employed, in full proportion with gold operations?

It is true that many dentists do not perform this class of work as well as they know, because they fear their patients, by reason of previous false education, will not be willing to pay for their best éfforts? If so, it is equally true in every instance that the dentist is guilty of moral cowardice. He lacks the courage of his convictions, and by yielding to such a weak and unworthy impulse he will in time come to lack any adequate conviction whatever.

It is our duty now and in the future to educate our patients in this respect. They should have it explained and emphasized that the restoration of broken down teeth with our newer amalgams is a different proposition from that which obtained years ago; that its possibilities are far greater, but dependent, nevertheless, on the most careful operations; and, therefore, *entitled to remuneration in proportion to the skill employed and value received.*

What they have paid in years past for "fillings" and "stoppings," and what unworthy operators may be "charging" for similar things now has nothing to do with the question of an adequate fee for

the honest service I have attempted to outline and describe. Let us do this class of work as it deserves to be done, and let us place it on the plane in the estimation of our patients, where it deserves to be placed, in these new years of the twentieth century.

IS REGULATION OF THE DENTAL FIELD ADVISABLE?

BY CLAUDE B. WARNER, D. D. S.

Read before the First District Dental Society at Rock Island, Illinois, September 24-25, 1902.

Knowledge in its several branches is allied and we are quick to take advantage of this fact in the special field of dentistry.

Our dental literature teems with facts gleaned from other fields. Today I will ask you to consider with me some phases of the dental profession, from the standpoint of political economy. As you are all aware, political economy treats of mankind in the ordinary business of life. The majority of us are engaged in the practice of dentistry for a livelihood, hence we should avail ourselves of any opportunity to gain light from a sister science upon this vital subject. To the present time the dental profession, like other business enterprises, has been under the economic doctrine known as "Laissez Faireb," which means, let well enough alone. With the ushering of the new century, however, there has come an unrest in the old economic doctrine and economists are agreed that regulation is needed for public good. Within the last thirty years our profession has advanced at a rapid rate in usefulness and importance, and now has a recognized standing, and the question now before us is whether we shall get in line with other lines of business or continue as before. It is a matter of deep consideration, for we, the dentists of the present, hold within our hands the future of the profession. It is well for each individual to pause at certain periods in his life, and inwardly view himself and his work, note his progress and forecast aims which he hopes to accomplish. The same is true of a profession, and with this intent of ascertaining, by economic methods, the condition of the dental field, the following questions were sent to dentists who were practicing thirty years ago and who are now practicing. Care was taken to send the circulars to representative dentists, both of city and rural districts, in different parts of the United States, and to send only to those who might not be biased by any influence in their opinions. The circulars were as follows:

DEAR DOCTOR: I am preparing a paper for the First District Dental Society and desire some data respecting conditions thirty years ago as compared with those of today. In this report simply the data will be used, and your letter destroyed so that nothing personal, as far as you are concerned, will appear. Will you kindly answer the following questions with the endeavor to make the report as accurate as possible. and oblige,

Yours truly,

How did the price of an individual piece of dental work compare then with today?

Ans.

How did your net yearly income compare?

Ans.

Has competition crowded your dental field since then?

Ans.

Do you now have as much spare time to devote to recreation and research as then?

Ans.

What do you think of the situation as regards the supply and demand of dentists at present?

Ans.

The majority of the dentists very courteously responded, for which thanks are due; their names have purposely been lost. The answers form food for thought. I regret that time demands a study of statistics, rather than the answers in detail.

In answer to the first question, "How did the price of an individual piece of dental work compare then with today?" I find that they are essentially agreed that prices were higher, ranging from 50 to 100 per cent. As to the second question, "How did your net yearly income compare?" ten per cent reply that it was about the same, twenty per cent make more at the present time, while seventy per cent do not make as much now as then.

In considering this question, three things must be borne in mind that affect these statistics, viz: (1) The gain in income that might come from a reputation and an established practice. (2) The loss which advancing years might bring from incapacity to work. (3) The gain or loss which dentists may have had in moving from one location to another. In answer to the third question, "Has competition crowded your dental field since then?" there are 90 per cent that notice an increase. The average seems to run from two to five times the number of dentists now, compared with the same amount of population. The census statistics will easily prove this to be true. The fourth question, "Do you now have as much spare time to de-

vote to recreation and research as then?" elicited a variety of answers of the same import. One dentist writes, "No, I have to work harder for what I get, and therefore have longer hours."

Another writes, in answer to the question, "Yes, I have more time to loaf!" In answer to the fifth question, "What do you think of the situation as regards the supply and demand of dentists at present?" all, with one or two exceptions, were of the opinion that the field is greatly overrun. One dentist from one of the cities says: "The demand for good and honest dentistry is no greater now than in former years, but colleges and dental parlors have raised H——l with the profession, especially dental parlors, where a man's ability is counted for nothing, but who can tell the biggest yarn!"

As a fair sample of the average circular returned to me, I will read, by his permission, the one answered by our own Dr. Magill, which reads as follows:

How did the price of an individual piece of dental work compare then with today?

Ans. As $10 to $12.50 is to $15 to $20. These figures are taken from my 1873-4 records.

How did your net yearly income compare?

Ans. About one-third more.

Has competition crowded your dental field since then?

Ans. Considerable; 1873-4 we had in this town three practitioners; now we have fifteen or more.

Do you now have as much spare time to devote to recreation and research as then?

Ans. Not much difference.

What do you think of the situation as regards the supply and demand of dentists at present?

Ans. From observation, I think one-half ought to seek other employment. I have always been of the opinion that dentists were born, not manufactured, for the gain.

Yours truly,
W. J. Magill.

Now, what are we to gain from these statistics? In economics, statistics are the instruments by which results are measured. Statistics cannot be reduced to mathematical certainty, as can a chemical equation; nevertheless, they can show equally well the operation of law. From these statistics we infer: (1) The average dentist today works harder and his income is less than what prevailed thirty years ago. The question naturally arises, what will it be in the next thirty years? The outlook is not encouraging, when we consider it in relation to other occupations. There is not the outlet for

skill that we have in other occupations of like ability. Compare, for instance, the income of the best dentist you know of, with that of the best doctor, lawyer, mechanical engineer, etc. I find in Bulletin No. 58, of the Department of Labor, U. S. A., that in the last thirty years, relative money wages in the various industries have advanced 33 1-3 per cent, and if we compare that with Dr. Magill's figures, showing a loss in the same period in the special field of dentistry of 33 1-3 per cent, it should make us pause and reflect a little. The second point I wish to make is that the cause of the lowering of prices and incomes is due to the fact that a larger number are entering the profession than the field can assimilate. In other words, we cannot get around the old economic law that the supply and demand of a commodity regulates its price. Dental services constitute a commodity the same as anything else. The third point to be drawn is that so-called commercialism, with its train of evils, is on the increase, and is the direct result of an overstimulated field.

We find it true in any special line of business that when competition is close there is a tendency for some to leave the struggle in the beaten path and resort to nefarious methods to gull the public. As a cure of commercialism we frown on the dentist practicing it, and exclude him from our societies. The cure is a poor one, as the evil still continues to grow vigorously. What should be done, is to regulate the field and increase the educational facilities, so that when the dentist emerges into practice he will have an education that will deter him, and a fair field to recompense him, without resorting to that which will bring to him the odium of his profession. As a fourth point, I might call your attention to the tendency of the present age to place improvements in the profession on a commercial basis. This question of patents was so fully discussed at the state society that I will not elaborate.

I might add in passing that more dentists would be willing to give to the public an invention if they could earn more in their practice, and, no doubt, there are many useful inventions lost to the profession every year simply because the dentist has neither time nor money to devote to his experiments.

It is the need of both dentists and public that one has leisure and income enough to devote part of his energy to the uplifting of his profession. Coming to our fifth point, I wish to call your attention to the fact that practically all the necessities, as well as the luxuries of life, are in the hands of trusts.

Even labor, itself, is represented by big labor organizations, which regulate their field of action. If we are forced to pay tribute in a thousand different forms from other business enterprises, is it not only right, but our duty, to follow the first law of nature? We have seen in the state laws, the Association of State Examiners, and the Association of College Faculties, the splendid results which come from regulation of the dental field, but the work needs to be carried still further.

We have still a haphazard condition regarding the dental field and the number of students entering it. By complying with certain conditions, any number of dentists can start a dental college and then begins the process of collecting as large a number of students as possible. It is notorious, the profit which comes from a successful dental college, so the incentive to start new colleges is a strong one. The number of new colleges springing up each year is good evidence of the fact. Every year the dentist is deluged with college catalogues, and the colleges even resort to advertisements in literary magazines and weeklies. I saw recently a full page advertisement of a dental college in "The Saturday Evening Post."

We dentists must consider the situation. Where colleges are in a race for students, there must come a time when the spawn is ejected into our field, and the troubles we have enumerated still continue to stay with us. In all economic difficulties there are many who come forth with a sure cure, but no cure is effected.

In this problem there are many factors to consider, and patience is needed to work out a plan. One of the ways that has occurred to me would be for the Association of College Faculties to co-operate with the different state societies, and ascertain the extent of the dental field in the different states and matriculate the number needed to supply the demand. By raising the requirements for admission, increasing the length of time in college, and increasing the cost of tuition, the colleges would not be the losers and our profession and the public would be better served.

Like other economic questions, this problem will probably not interest those dentists not directly affected, still the question is before us and sooner or later we shall all of us feel the result of a diminished field. It is not possible in a paper of this kind to cover all the points one would wish to on this subject.

It is my desire that others continue this subject by word and by deed, so that economic regulation of the dental field shall be a matter of fact.

PYÆMIAL GINGIVITIS.

(Read Before the Northern Indiana Dental Society at South Bend, Ind., Sept. 24-25, 1902.

A. C. HEWETT, L. L. B., M. D.

Papers have been read, Booklets distributed, Lectures delivered and Books of which there seems to be no end, have been published upon "Riggs disease." My theme is closely co-related to conditions described by and named for that distinguished worker of Hartford, Conn., J. M. Riggs. Said conditions have been variously named by various writers; and mis-named when those writers have grouped those various, and varying conditions and attempted to apply one cognomen to designate them. To the reader, unaccustomed to classify, dissect, digest and assimilate truth only, those writings have been and are as confusing as it would be in a pathologist to write of Typhus and Typhoid, Smallpox and Scarletina under the heading of Major Exanthemata and, for treatment advise only topical applications to the exanthem. The physician who should treat the eruptions topically and neglect constitutional remedies would be jeered at, if not tried for Mal-practice.

The most objectionable and misleading name given for "Riggs diseases" is Phagadenic Pericementitis. Phagadenic, *Rodent,* is a term which was for years before Dr. Riggs called attention to conditions, (about 1850), applied to Syphilitic and gangrenous ulcers. Happily, so far as I know, only two writers of note have adopted so misleading a name. Phagadaena signifies ravenous hunger; (Rodent-Beavers at tree cutting may illustrate that which rapidly eats away; Gangrenous and Sloughing. Gangrene and sloughs rarely if ever appear in the group of diseases described as pyorrhœa. The Pericementum is a thin membrane and melts away slowly (all too surely). Supuration is usually present, and sooner or later teeth are lost. A better term would be

Supurative Edentation.

Nought should be cared for the name; every consideration be given to the condition. Paraphrasing the Sententious Apothegm, made immortal by Grover Cleveland, *Conditions Confront us; not names.*

The theme of this paper is one of the conditions mentioned by that big-hearted, big-bodied brainy Buffaloian, Barrett, "Pyorrhea Alveolaris"; but he names the pathological conditions as covered by the term he thus gives apologetically. Vide Oral Pathology and Practice—Barrett P. 109 et seq.

The third condition (I may call it disease) named by him I have hinted at under the title.

Pyæmial Gingivitis.

There is in the whole group of oral diseases covered by the term "Riggs desease" no condition more to be dreaded; and that disease which may aptly be named Phagadenic, should never be grouped with Riggs disease or pyorrhœa. It is fortunately a rare disease better named Lupus Cancrosus. Dr. Barrett says of his third named, "The prognosis of the third condition is almost invariably bad." Ibid p. 113.

I venture a few definitions to which I call attention and ask that they be borne in mind that I may not be misunderstood.

Pyaemia. Purulent contamination of blood producing marked depression of the vital powers, the formation of abscesses in various regions of the body, etc., constituting the diathesis, *infectio purulenta* etc. See Dunglison's Medical dictionary.

Gingivitis. Inflammation of the gums. So by fair interpretation, the term means what I have named it, and is a condition such as will be briefly described. The condition having passed that of hyperemia, there has commenced a breaking down of the elements of tissues or the tissues themselves.

Inflammation then means a disturbance of nutrition in a tissue, following hyperemia, the source of which may be nervous shock direct or reflex. Dunglison defines inflammation as phlegmon; which requires in addition to hyperemia altered nutrition of the blood-vessels, and surrounding tissues. It is apt to terminate in supuration, etc., (vide his dictionary 21st ed. p 856).

This disease attacks not only the human species of all races, but the lower orders of animals as well; the latter, (carnivora, omnivora or herbivora) however escaping it till advanced age. In man it never appears before the age and event of puberty. It rarely appears in males before the age of forty years; but in the mouths of females about ten years earlier. The milder forms of the trouble may appear earlier in either. Unlike Furunculus, Paronchia, or Carbuncle, the precise time of the invasion of the desease cannot be determined, either by the patient or Physician; no temperament is immune, the high and lowly suffer alike; neither blonde or brunette can claim exemption; the toiler and the person of leisure balance in the scale; little if any difference can be observed between the intemperate and the abstinuous; Vegetarian and meat-eater suffer alike; and alike liable to ravages of the disease are the cleanly of habit and the unwashed and uncombed.

I need not give minute description of appearance or symptom. It is the Bete-noir of the whole profession as it is the Beast and Bogy in your paths. I will bring before your mind a typical case; one that the unskilled in stomatopathia even will readily recognize.

The patient a blonde. Well rounded, full habit, taper limbs, blue or hazel eyes, apparently well fed and nourished, about thirty-five years of age, teeth good sized, well developed, nearly or quite a full set, practically sound, or well filled, careful with tooth brush, dentifrice or gingivarium; social position above question, purse well filled, but patient alarmed and discouraged that the regular, white teeth have begun to loosen. "Why! My gums are all sore and bleed so easily, and I have taken such good care of them, too." "When did they commence troubling you?" "O, I can scarcely tell you."

Upon careful examination of the case, nearly or quite all the teeth are loosened. What of inflammation is apparent is sub-acute. Gingivae may be pale, not much thickened, or tumified; there may or may not be many well defined or deepened "Pockets." But the gums have receded, leaving "dentine" exposed. If there are pockets there may or may not be serumal nedules or calcarious deposits; always pus, or Ichorhæmial oozing from a strip of gum denuded of epithetium next to the teeth, on bucal, labial, lingual and interdentinal aspects; the width of the oozing zones varying from one-eighth to one-fourth of an inch. Worse than all, the alveolus has melted down, its thin tooth-enveloping plates, so beautiful in health cut away, leveled down, gone.

There is a condition of the general system always present not generally recognized except as incidentally. The Capillary System is in an atonic condition, and of course there is a corresponding lack of tone in the peripheral nerves. All epithetium sympathizes. If pressure upon any part of the body is made a pit will be left for too long a period. If any portion normally covered as the arms or thighs are exposed to the air, an abnormal coldness is perceptible. An abrasion of the cuticle leaves a patch that is too long in healing. These symptoms and others point to overworked capillaries. The eliminative functions are at fault. This general condition is not to be wondered at. There are in a full mouth 32 teeth with a circumference at enamel line not far from an inch, on an average. With a zone one-eighth of an inch in width gives 32-8 or four inches surface secreting pus. Concede but half that. Two inches of oozing cultures for microbes, less than one-half as much of supurating tissue in a furuncle, felon or carbuncle drives strong men to profanity and women to hysterics. Think of it not from the revolting standpoint of offense to refined cleanliness, or shock gustatory sense,

but from the view of detriment to general health. That pus builder is not on the face, or hand, where the sun can dry it up and the winds waft away the odors, but in a pocket; the mouth, to be warmed by the heat of the blood, moistened by saliva moved from gingiva by tongue and cheeks toward, on and over the fauces, to the trachea, to be breathed across; down through the esophegus, into the stomach to be digested (?). What of the Micro-organisms? Are they turned to aliment, assimilated with the nutriment designed to substitute waste? They go with the nutriment, as camp followers trek with an army; and like camp followers leave poison, ptomaines at every bivouac. Think how a paronchia on a finger end will kindle a fever-glow over the whole body; how a carbuncle with supurating surface not much larger than a United States dime will send poison all through a strong man's body with frequently fatal results. I need not refer to an aphthous ulcer upon cheek or tonsils; or another ulcer, to name which is a shock to polite listeners. The scratch of a needle, the bite of a spider, tarantula or Echidna Ocellata, (the latter fatal in a few seconds), furnish a lesson easily applied.

The natives of the tropics when bitten by a tarantula or any venomous reptile meet the poison by constitutional as well as local remedies, and save imperiled lives. Why should we omit systemic medication when dyshæmia exists?

I have hitherto been silent concerning this condition. But though dumb, I have not been blind. An unusually long experience, and as close observation as I have been able to give, aided by carefully reading everything upon this subject that came under my eyes have convinced me beyond a doubt that not a single case ever existed of Pyorrhea Alvolaris, justly so called, or called by any other name with *conditions* as described, that was not accompanied by distinct, well marked *pyæmia* or *toxicohaemia;* of course chronic or sub-acute in intensity and manifestation, but so persistent is the discrasia, kept up by the feeding fount in the mouth, that the *Vis Medicatrix Naturae* is beaten down and drowned in the toxic flood and even after disease has won, the teeth fallen out, or been extracted, and the edentulus jaws healed the epithetium is so sensitive that many artificial dentures have been condemned as "Misfits" because the gums, tender from Capillary and peripheral nerve excitement, could not bear the tilting, and pressure incident to occlusal stress. Many a dentist has been surprised and annoyed from this cause; wondering why his plates did not fit, and puzzled in trying to determine the occasion of irritative conditions under apparently good adjustments.

It was this sensitiveness of the gums after extraction that first arrested my attention, and caused the inquiry why? Dr. Barrett says under the head of Prognosis of the third division "When a radical cure of this form of the disease has been effected, it has usually been because of some constitutional change in the general tone of the sufferer." (Ibid p 114.) His words are wisely spoken; and though he does not say whether the lack of tone is causative of the condition, or resultant, I do not know as it matters. A sword thrust or bullets impact severs cuticle fascia, muscle and artery. Edges are everted; a wound gaps, blood flows. A condition confronts us. The sword is withdrawn, the ball has plowed its way through, and out. The condition challenges our best endeavors. If blood is wasting, Hæmostasia Mechanical or Medicinal, or both, must be secured. Does the wound gape, then coaptation must be maintained, that bloodplasma may furnish scar tissue.

And thus it is with Pyæmial Gingivitis. A condition exists.

What is that condition? I need not recapitulate, but proceed to give a course of treatment that has proved uniformly successful when endurance of the patient, and the patience of the operator were equal to the requirements. To succeed is no play or pastime.

First, remove all serumal, salivary, sanguenary, calcic or other deposits, and all foreign substances, and thoroughly cleanse all pockets and supurating surfaces. Perfect instruments alone should be used, and as perfect tactical skill be practiced. (Bear in mind I am speaking of the cure of the case I have described, selecting the upper jaw for treatment.) To secure the loosened teeth from undue stress while removing deposits, wax a strong fine twine long enough to encircle eight teeth. Begin at third molar on one side, enloop it and interlace the twine around the teeth till you reach and encircle the central incisor. Bind the half set firmly together. Do the same on the other side. This if well done will leave space between the central incisors. With a shorter third twine bind the centrals firmly in contact, thus tightening the first two twines. You will thus gain time in removing deposits. Use a 4 per cent solution of cocaine freely to render the operation endurable.

Immediately succeeding the instrumentation flood the pockets and gums with Dioxogen. I cannot too strongly commend it for catching and bringing to the surface, pus gobules, sanious exundates, fine particles of dislodged tarter, and vitialed food particles. I think the Oakland Chemical Company's make reliable and of great value. Being a solution of H_2-O_2 it is bland and non-toxic. It should be diluted. Dioxogen 1 dram, Water ½oz. Whatever objection there may be to

the use of binoxides in closed pockets, on account of effervescence are not rational in this condition. Having *cleansed* the necks of the teeth pockets, and gums denuded of epithetium, the next step is (a) to keep them surgically clean—aseptic, (b) and hold the teeth rigidly in position—some position immovably. A loosened tooth will remain loosened if left subject to "The Wabbles." Can I make these points more emphatic by repetition? Then I repeat, clean every pocket, exposed root, and oozing surface. Keep them clean; surgically aseptically. Band shaky teeth into a fixed position and hold them thus. This may be readily done by a system of bands, using 32 to 34 gage platinum, or German silver of a good quality or even copper, the salts of which latter are helps to healing.

A great aid to restoration of lost alveolus is to fit plates over the gums, letting the buccal and lingual borders rest upon them, while the borders next the necks of the teeth are raised from the gums the distance equaling the thickness of the desired new alveolar tissue. The buccal and lingual rims of the plate for about one-fourth inch in width should rest flatly on the gums; while the inner edges are raised giving space for and shaping the new growth.

It were gratuitous superogation for me to suggest to the metal workers of today among dentists how the adjustments of bands, and plates are to be made.

Surprising restorations of lost alveolar tissue can be secured without plates. Secure the teeth to a rigid immobility and to the other treatment suggested, add vigorous massage to the gums with finger ends for five to ten minutes at a time daily.

Medication Local and General.

Strictly speaking, there is no Local Medication possible. The powers of absorption especially through the tissues of the mouth, are something wonderful. (No double meaning is intended.) I refer to the capacity for imbibition through the epithelial tissues of the oral cavity aside from Deglutition. It is a well-known fact in dosage that a fraction of a full dose of many drugs is as efficient remedially, when laid upon the tongue, and not swallowed as the full amount given by pill, bolus, capsule or tablet, passed into the stomach undissolved. This is true of Strychnin, Morphin, Atropin, Strophanthin, Caffein and other concentrations. This helps to explain the frequent fatalities attending the first three or four inhalations of Chloroform unskilfully administered. I speak of it that double dosage may not occur by topical remedies applied in the mouth, and constitutional Medicaments taken into the stomach. I have known grave complications following a violation of this caution.

I do not hold to the theory that heroic cauterization is necessary or best, but if any cauterants are used let there be astringency along with the escharotic. I know nothing better than Sulphate of Zinc. Some prefer the Chloride. A favorite prescription is:

R.	Sulph Zinc	grs. x.
	Ulmus Fulva Pulv.	grs. x.
	Orris Root Pulv.	grs. xv.
	mix and triturate.	

Pack into pockets under loose gums and into interdentinal spaces, letting it remain an hour or longer. This is to be followed by the dioxogen dilute as mentioned above; thence on, the gums to be locally medicated by the chosen Germicidal antiseptic.

There are so many gingivaria for the purpose that selection will be the real difficulty. Do not neglect the Dioxogen (Oakland Chemical) properly diluted. As an official for search warrant and ejectment, it has no rival; but there is a stimulant and tonic needed for the Capillaries, and peripheral nerves, that the dioxogen cannot furnish; this is supplied by cocain and oil of cloves, as has been clearly suggested by theory and proven by experience, the latter *the only real test of value.* I give formula:

R.	Cocain (coarse crystals)	24 grs.
	Carbolic Acid	20 grs.
	Oil of Cloves	2 f. oz.
	Specific Cactus	1 f. oz.
	Specific Echafolta	2 f. oz.
	Glycerine Pure Ad.	1 f. oz.

Sig. Apply to pockets and oozing gums. It is best applied with painter's round brush, about No. 2.

If the foregoing suggestions have been followed, and skilfully executed, you are in a fair way to cure (not the incurable). I say *under way to a cure.* You never did and never will perfect a radical cure unless aided by constitutional Eradication of blood discrasia, or changed depraved states of the systemic fluids. There is a possibility of such eradication by the power of nature, aided by absorption from the local antiseptics used, but the possibility is remote. Better supplement the local remedies by Constitutional Alteratives, Eliminantia, and Eutrophics. As these latter aids have not been especially dwelt upon by writers, named as such, and accentuated for efficiency, I will give a brief list and add formulae for the use of those I deem best.

Alteratives, (Allopathic).

Mercury, Iodine, Iodide of Potassium, Arsenic, Gold, Manganese,

Sassaparilla, Iris Versicolor, Stillingia sylvatica, Echinacea-purperia.

Alteratives, (Homeopathic).

Sulphur, Hepar Sulphur, Baptisia, Arnica, Silica, Mercurius, Mercurius Vivus.

Of the last named school, Dr. F. M. Richardson, of Chicago, a deep thinker and successful practitioner advises high attenuations and triturates.

Of course the list might be greatly extended, but if there were failure with these I should despair of success.

Do not understand me as under-estimating the necessity of local treatment. On the contrary I lay great stress upon it. But I insist as strongly upon the constitutional treatment. "These things ought ye to have done and not to have left the others undone." It was a wise Philosopher who thus spoke.

To obtain the best effect of Mercury as an Eliminant and alterative I advise a one-tenth grain tablet of Calomel with soda, dissolved in the mouth and swallowed every ten minutes till one grain has been taken. This at approaching bed time; followed in the next morning with a seidlitz powder before breakfast thence on with one-tenth grain tablets in the mouth as before four times daily before meals and at bed time. This should not be continued beyond the appearance of ptyalism; and then Echafolta (from the Echinacea) should be given.

R.	Specific Echafolta	ij. dram.
	Specific Stillingia	j. dram.
	Glycerine (pure)	j. dram.
	Aqua ad	jv. oz.

M. Sig. One teaspoonful four times daily before meals, and at bed time. One other formula is of rare merit.

R.	Comp. Syrup of Stillingia	ij. o.
	Iodide of Potassum	ij.oz

M. Sig. One tablespoonful four times daily, after meals and at bedtime. Arsenic should not be lost sight of. It is a very efficient aid.

R. P. Donovan's Solution (Iodo-Arsenite of Mercury) given in doses of five drops in a wine glass of water four times daily. Increase the dose daily one drop (unless illy borne) till fifteen drops are reached. Then decrease dose by one drop till five are reached.

Fowler's Solution (Liq. Pot. Arsenites) may well be alternated with Donovan's, but a larger dose than ten drops at a time should not be given; beginning with five drops, diluted and doses increased and decreased as directed for Donovan's Solution.

If Homeopathic alteratives are selected, then I believe that Hahnemannic dosage should be followed, and that alone. No half and half compromising.

I am well aware that much has been written and spoken upon this subject. Deep, careful investigation has been given to it, and yet I think fully half of the entire dental profession believe there is no cure for any but the simplest forms of the diseased conditions. I should have been of that opinion today had I not years ago discerned what I conceived the source of failure. I believe, as I have said elsewhere, that "Failure in accomplishment oftener suggests re-choice of material or of method than abandonment of enterprise." AMERICAN DENTAL JOURNAL, August, 1902, p. 36. I approve most heartily what has been done in the treatment of these conditions locally and am grateful for the hints given by Drs. Miller, Barrett, Kirk, Pierce and others that there are constitutional as well as local, and germicidal conditions. So certain am I of a systematic discrasia in every case that if I had to choose between the constitutional and local disease theory, and between general and local treatment, I should without a moment's hesitation in each case, choose the former; but I choose both.

As I intimated my investigation has been conducted for years on the "Still Hunt" plan. I have neither written papers, or in oral argument previous to the present, declared the opinions I now hold. I regret that I could not on the present occasion do so more elegantly and forcefully. If I have said what will awaken you to renewed study, and invincible courage, I shall feel that my coming has not been in vain.

PRESIDENT'S ADDRESS.

Delivered at the Opening of the Northern Iowa Dental Society, at Cedar Rapids, Iowa, September 2, 1902.

Seven years ago, in my response to an invitation to the dentists of Northern Iowa, about thirty of us met at that beautiful summer resort, Clear Lake, organized the Northern Iowa Dental Society, little dreaming of the bright, useful and instructive future in store. With the assistance of that prince of entertainers, Dr. Clack, we had a profitable and enjoyable meeting and returning to our homes we resolved to keep alive those embers of progress so ably kindled. Our excellent meeting this year gives testimony that we have, thus far, succeeded.

The object of the society was so ably stated by Dr. Brower, the second president, in his address, that it will bear repeating. "Mutual

benefit of the dentists of Northern Iowa. To reach a greater number of men and interest them in society work. To oppose nothing, but rather to advance the interest in our state society." In forming these societies we often reach and interest those, in the immediate vicinity, that attend no society meeting, and many times we unexpectedly come in contact with bright minds, that otherwise might have practically remained buried, lost to us and they virtually rusting out. In this age of progress it should not only be the pleasure, but the absolute duty of every dentist to attend the meetings and identify himself with society work. Those who are continually conspicuous by their absence are doing themselves and the public in general an injustice and ultimately public enlightenment and sentiment will demand and crown with success, only those who are progressive, attend society meetings, are alive and in touch with the problems of the day. There are two positive positions only, for the dentist of today to assume. To advance or retrograde. There is no "happy medium," and as the years roll by, the dentist who is so shortsighted as to his advantages, will finally see the great gap and then when too late realize that his professional life has been a failure. The numerous benefits to be derived from these meetings are so plain and self-evident that it is simply unnecessary to touch upon them. By maintaining society work and thereby furthering those principles that *will* lead to success, we are discharging a duty we owe to ourselves and to humanity. Members of the society, I thank you for the honor you have conferred upon me and ask you to kindly overlook my shortcomings. To these able men, who have favored us with their presence and so liberally impart their knowledge and experience, we are under lasting obligations and thanks. I also wish to thank the officers of this society and the Cedar Rapids Dental Society for the hard work they have done and congratulate them for the excellent program and entertainment provided, that has insured this successful meeting. May this meeting be an oasis, to all of you, in the desert of your practice.

Editorial....

THE ODONTOGRAPHIC CLINIC.

It is not too early to call attention of the dental profession to the importance and magnitude of the clinic to be held in Chicago, February 16th and 17th, 1903, of the Odontographic Society of this city. The committee having this matter in charge have been at work upon the details for more than five months and much towards organization has been done. Clinicians from every state in the Union will be present and six papers of rare importance will be read. It is yet too early to publish names of the important gentlemen who will participate, but enough has been done to say that doubtless this will be one of the most important meetings ever held in this country. From time to time until February the American will publish the progress made by the committee regarding this undertaking.

Any information regarding its further details will be gladly given by Dr. C. E. Bentley, of Chicago, who is chairman of the program committee.

To those who are interested in seeing exhibits, their desires will be gratified at this time as already the largest number of exhibiters that ever exhibited at any one meeting have signified their intention of being present with an exhibit. Every dentist in the country should keep this meeting in mind and make their arrangements to be present. Chicago can always do things up "brown," but on this occasion we can assure every dentist that this meeting will be the best and largest and "brownest" ever held.

Streator (Ill.) Professional Fellowship Club Passes Resolution on the Good Work of the Illinois State Board of Dental Examiners.

At a meeting of the Streator Professional Fellowship Club, September 10, 1902, a vote of thanks was tendered the State Board of Dental Examiners, and Dr. J. N. Crouse for the efficient work done by them in the suit brought by a graduate of the German American Dental College before Judge Chetlain.

Let the good work go on, and may those who traffic in Dental Diplomas be made to suffer.

DEXTER H. DAVISON,
Sec'y Streator Professional Fellowship Club.

.. ITEMS ..

Dr. R. H. Hood, of Sparto, Ill, spent a week in Chicago during September Chicago has become such a famous summer resort that everyone flocks to the metropolis to combine business with pleasure.

Dr. M. W. Robertson, of Plymouth, Wis., took a special course in porcelain work under Dr. W. T. Reeves during the summer months. Chicago is fast becoming the mecca of porcelain workers who journey miles to get the teachings of Dr. Reeves in his advanced methods of the porcelain art.

The Odontological Society of Chicago gave one of their dinner parties at the Chicago Athletic Club on Wednesday evening, September 24th, having as a special guest of honor Dr. Florestan Aguilar, of Madrid, Spain. About ten outside dentists of the city were also guests upon this occasion.

Dr. Aguilar was on a mission to this country as a special representative of the Federation Dentaire Internationale, conveying to the President of the National Dental Association the acceptance of the invitation of the association to hold the Fourth International Dental Congress at St. Louis during August, 1904.

Dr. Aguilar, although being a native Spaniard, is an American graduate and in consequence of which his government designated him as a special envoy to this country to inspect the various dental schools of the country with a view to establishing a dental school in Madrid. He was also putting in some good work for the dental section of the Medical Congress to be held at Madrid during February, 1903.

Dr. Aguilar is a gentleman of fine address, speaking English fluently as well as four or five other languages—a progressive dentist, editor of a dental journal and last but not least, an all-around good fellow. He promised he would be present at the Fourth International Dental Congress at St. Louis in 1904.

At the twentieth annual meeting of the First District Dental Society of Illinois, held at Rock Island, September 23 and 24, the following officers were elected for the ensuing year: President, Claude B. Warner, Avon; Vice President, A. I. Sargent, Galesburg; Secretary, H. W. McMillan, Roseville; Treasurer, L. W. Skidmore, Moline. The next annual meeting will be held in Macomb.

Dr. William Mitchell gave a dinner to a few of his professional friends in London, Tuesday, September 2, at the Trocadero. Those present were Drs. W. Mitchell A. E. Farmer, B. Holley Smith, T. W. Brophy, A. W. Harlan, W. C. Barrett, L. J. Mitchell, C. Rathbun, Gordon White, W. W. Walker and H. J. Goslee.

Dr. C. Edmund Kells, of New Orleans, took another one of his yearly post-graduate courses among the various Chicago dentists during the week of September 8-13. A small dinner party was given to a few friends at the Chicago Athletic Club on the evening of September 11. A most enjoyable time was had by all those present and each guest departed pronouncing Dr. Kells a prince of entertainers.

Notices of Meetings

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Illinois State Board of Dental Examiners for the examination of applicants to practice dentistry in the State of Illinois will be held in Chicago on Friday and Saturday, October 17 and 18, 1902.

A recent opinion of the Attorney-General specifies the following as being eligible to take the examination before the Board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to removing into the State."

All applicants must come prepared with instruments, rubber dam and gold to perform practical work.

The examination fee is ten dollars. Any further information can be obtained by addressing the secretary.

J. G. Reid, D. D. S., Sec'y,
1006 Champlain Bldg., 126 State St.,
Chicago, Ill.

NORTHERN ILLINOIS DENTAL SOCIETY.

The Fifteen Annual Meeting of the Northern Illinois Dental Society will be held at Rockford, October 15th and 16th, 1902.

Members of the profession are cordially invited.

J. J. Reed, Secretary.

THE SOUTHERN ILLINOIS DENTAL SOCIETY.

The Southern Illinois Dental Society, after some years' rest, will hold its next annual session at Alton, October 14th and 15th. A cordial invitation to be present and take part is extended to all. There is promise of a good program and a good time.

CHAS. B. ROHLAND, Sec'y., Alton.
GEO. A. MCMULLEN, Chairman Ex. Com,, Alton.

SOUTHWESTERN IOWA DELTAL ASSOCIATION.

The Southwestern Iowa Dental Association meets at Clarinda, Ia., October 14th and 15th.

H. C. BARNHART, President. WILL J. MATHER, *Sec'y.*

VERMONT STATE BOARD OF DENTAL EXAMINERS.

A meeting of the Vermont State Board of Dental Examiners will be held at the Pavilion Hotel, Montpelier, Wednesday, October 8, 1802, at 2 p. m., for the examination of candidates to practice dentistry. The examination will be in writing, and will include anatomy, physiology, bacteriology, chemistry, metallurgy, pathology, therapeutics, surgery, materia medica, anesthesia, operative and prosthetic dentistry, and an operation in the mouth. Candidates must come prepared with instruments, rubber dam and gold. Applications, together with the fee of ten dollars, must be filed with the Secretary on or before October 1.

C. F. CHENEY, Secretary,
St. Johnsbury, Vt.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The fifth annual meeting of the Southern California Dental Association will be held at Riverside, California, October 20th, 21st, 1902. An interesting program has been prepared, and the profession in this and neighboring states is cordially invited to be present.

L. E. FORD, Sec'y, Los Angeles.

Original Contributions

A PLEA FOR BETTER THINGS.

BY GEORGE EDWIN HUNT, M. D., D. D. S.

Read Before the Northern Indiana Dental Association at South Bend, Ind., September 24th, 1902.

Dentistry is both a science and an art. The Century Dictionary says that science is "knowledge gained by systematic observation, experiment and reasoning; knowledge co-ordinated, arranged and systematized," and that a scientist is "a person versed in or devoted to science." It further states that art is "a system of rules and traditional methods for facilitating the performance of certain actions; acquaintance with such rules or skill in applying them, as in any manual trade or handicraft, technical profession or physical accomplishment," and gives two quotations, as follows, to illustrate the definition:

"The object of science is knowledge; the objects of art are works. In art, truth is the means to an end; in science it is the end." "Theorists, by an observation of particulars and by generalizing on them, attempt to construct a system of scientific propositions with respect to a certain subject; upon which system a set of rules intended for the guidance of practice may be founded. These rules form an art." Dr. Hurty tells us that science is a systematic arrangement of facts, a succinct and satisfactory definition.

Under these definitions I think we may reasonably claim that a part, at least, of our dental knowledge is scientific; a part of it is a systematic arrangement of facts; it is partially "knowledge co-ordinated, arranged and systematized." But even much that we designate as the scientific side of our profession is not properly so called. Mathematics is an exact science. Figures cannot lie, even though men that figure *can* lie. Twice two is inevitably four, and the square of the hypotheneuse of a right angled triangle is invariably equal to the sum of the squares of the other two sides. There are but few general propositions in dentistry of which you can speak so confidently. As I write this the only important dental question I recall that has been settled on a truly scientific basis is the germ theory of decay. Miller's work, condensed, was as follows:

1. He found that fresh saliva, mixed with starch (1:40) kept at blood heat became acid in from four to five hours. This indicated fermentation.

2. When the starch and saliva mixture was heated to 100 C. (212F.) for half an hour and then placed in an incubator it did not develop acid in twenty-four hours. This proved fermentation.

3. When the starch alone was heated to 150 C. (302 F.) and then the mixture made the acid was again developed. This proved that the ferment was in saliva, not the starch.

4. A mixture of saliva and starch was subjected to a temperature of 67 C. (153 F.) for twenty minutes and placed in an incubator, where it promptly became acid. Now, the ptyalin in the saliva is an inorganic ferment and is destroyed by a heat equal to 150 F., but organic ferments are not destroyed at that temperature. This proved that it was an organic ferment in the saliva that was producing the acid.

5. Several drops of a fresh solution of saliva and starch were put in each of several sterilized test-tubes and sterilized. One tube was infected with carious dentin. In twenty hours the solution was sour. From it another tube was infected and that developed acid. From this second tube a third was infected, and so on, all developing acid. This proved that the ferment was an organized, reproductive one, and that it was found in carious dentin as well as saliva.

6. Cultures from these deeply infected dentin showed the growth of organisms identical in form with the bacillus acidi lactici. Grown upon carbo-hydrates (such as starchy and sugary foods) acid solutions were formed; grown upon beef extracts without carbohydrates no acid was formed. This proved the necessity of a starchy substance to produce this particular fermentation.

7. Sections of sound dentin were placed in neutralized 2 per cent solution of beef extract in one tube and similar sections in the same solution in another tube, except that 0.2 per cent of cane sugar was added and both tubes were sterilized. The two tubes were then infected by this organism obtained by culture from infected dentin. After several weeks no acid was present in the first tube and the dentin was unsoftened. In the second tube, containing the cane sugar, the acid reaction was pronounced, the sections of dentin were softened, and under the microscope showed broken down tubules. Miller had artificially produced decay and had further proved the necessity for the presence of starch in the production of it.

He next collected by a tedious operation a sufficient quantity of the acid solution produced during the starch and saliva fermentation to put it through a careful chemical analysis and prove it to be lactic acid, and later he obtained lactic acid directly from carious tooth bone.

He then made the following announcement: "Whenever solutions of sugar (nearly always present in the human mouth) stagnate in fissures, between the teeth, etc., they must become acid. The acids gaining access to the dentin decalcify a portion of that tissue; the tubules of the decalcified dentin take up the solutions of sugar and organisms. The organisms produce lactic acid in the tubules." And so decay proceeds.

Miller is a scientist. He has co-ordinated, arranged and systematized knowledge gained by systematic observation, experiment and reasoning. But where can you cite me another point in dentistry that has been thus irrevocably decided, outside of the anatomy and physiology of the parts? And that was largely decided for us by the medical men. Our knowledge of the bones of the head and of the soft tissues surrounding them is microscopically scientific. Our gross anatomy consists of a systematic arrangement of facts. Our knowledge of the physiology of the mouth is also fairly exhaustive and may be said to be scientific—but there our science ends. And why?

If the question were put here to any one of you today, Is dentistry on a scientific basis, and do you consider yourself a scientist? I have no doubt you would one and all agree that dentistry is based on science and that the practitioners of it are scientific men. But I seriously doubt whether such an assertion could be successfully sustained if exposed to the bright light of criticism. Let us enumerate a few of the obvious points that still await a scientific settlement.

From what do the buds for the twelve permanent molars develop? In a vague sort of way we know that those for the incisors, cuspids and bicuspids are secondary buds formed on another portion of the same epithelial tooth bands, from which the twenty deciduous teeth have their origin. But this band does not extend back of the deciduous molars, so where do the permanent molars have their origin? Several dental histologists have advanced several different guesses, only one of which can be correct, and none of which are proven. There, you see, is a question in embryology awaiting a scientist. And there are a dozen more just like it.

Again, what is the substance holding together the enamel rods and what forms the striations across the rods? One man says it is

a mineral cement. Another claims it is an organic substance. While still another says there are no striations until after the enamel is prepared for microscopic examination, and that the fluid used in preparation gives it the striated appearance. There is ingenuity for you! How will you disprove his assertion? You cannot study the enamel until it is prepared for microscopic examination, and when you prepare it you put in the striations. So we do not even know enamel yet histologically.

What causes the pain in cutting living dentin? When I was in college I was told it was due to the nerve fibrils in the dentin. That seemed fair to me and I believed it for years until along came some fellow with an inquisitive mind who discovered that there is no semblance, not a cell, of nervous origin in the dentinal fibrils but that they are of a very lowly organized grade of tissue almost resembling protoplasm. And that knocked the nerve theory galley-west. Then somebody else builds up the ingenious theory that the tubules are full of moisture and that pressure on the columns of moisture, water not being compressible, is transmitted to the pulpal tissue where there *are* nerves.

So much for the domain of histology and embryology. And let me again impress on you that I am only scratching the surface as I pass along. There are innumerable other questions in these branches still awaiting a settlement. Now let us turn for a minute to pathology. Just for a glance. For instance, pyorrhœa! What a vast speculative vista the word conjures up. With this man's theory and that man's theory and no man's knowledge, is it constitutional or local in its origin or both or neither? Who can say? A dear friend of mine in Chicago believes he has isolated a specific bacterium to which it is due. Others assert it to be entirely local in origin because a cure always follows extraction. Still others claim it to be purely constitutional because an excess of uric acid is usually present and anti-rheumatic treatment frequently gives relief. And a large body of practitioners claim it to be both, according to the varying symptoms and course of the disease. In this connection I do not mention treatment, which is as varied as there are drugs in the pharmacopœa, and all of it purely empiric necessarily. When we do not know the genesis of a disease, when we have no scientific knowledge of its origin, our treatment must of necessity be empiric.

Another point in pathology. While our knowledge of aveolar abscesses is fairly scientific in its extent, there are thousands of dentists who know as little about the pathology of these cases as they do of Sanskrit. You have all heard the most crude and

ludicrous theories and deductions advanced concerning the causes, course and prognosis of alveolar abscesses—a subject upon which scientific knowledge is obtainable. And their treatment! The leaves of the forest are not more numerous. Dr. Experiment had a patient in the chair with an alveolar abscess requiring treatment and, the carbolic acid bottle happening to be empty, he shut his eyes and picked up the first bottle his outstretched fingers encountered in the medicine case. Tried it with seemingly good results. Encouraged by this, he tried it again on another patient. Results good. Looks at the label on the bottle to ascertain what it is, and writes a letter to the nearest dental journal regarding his new treatment of alvoelar abscess. The picture is not overdrawn. At the meeting of the National Dental Association at Niagara Falls last month I had some gentleman gravely recommend a new cure for pyorrhœa to me. He had discovered it by accident. The patient had to have something done, and as he was out of the standard remedies for the trouble, he picked up his sandarac varnish bottle, or his pickling solution, or a tube of tooth paste, or something, and found the treatment worked "first rate." I thanked him.

The foregoing are just a few instances cited from the many to show you wherein we fall short of being scientists and where our knowledge, such as it is, is not "gained by systematic observation, experiment and reasoning." The causes of erosion, the chemical reaction responsible for the disintegration of cements, the cause of periodical immunity from decay, all these are questions awaiting a scientific solution. Is there any therapeutic action of a pure tin, or a tin-gold filling against a cavity wall and if so what is it? What is the process by which a tin-gold pellet becomes hard when used as a filling material?

But now let us turn toward the art side of our profession and see whether we can successfully defend our right to be called artists and not artisans. Let me again quote the illustration descriptive of an art. "Theorists, by an observation of particulars and by generalizing on them, attempt to construct a system of scientfic propositions with respect to a certain subject; upon which a set of rules intended for the guidance of practice may be founded. These rules form an art." And again, "In art, truth is the means to an end." So that our practice should be based on a scientific knowledge of facts, if we are to be truly following an art, instead of a trade. But is our practice so based?

How about root canal treatment and filling? I know men, and they are good dentists, who insist that in no case and under no circumstances is it permissible to enlarge the apical foramen. And I

know others who believe that if there are evidences of infection beyond the pulp chamber at all, the foramen should be enlarged and the tissues beyond treated antiseptically. Some men never enlarge a root canal. Others always enlarge a root canal. Both ideas cannot be correct.

Again, given a hundred root canals in perfect condition for filling, there is certainly some one substance that is best adapted to securing the best results in all of those canals. But what is it? Those hundred root canals, in the hands of a hundred different operators are liable to be filled with cotton, chlora-percha, gutta-percha, oxy-phosphate cement, oxy-chloride cement, paraffin, beeswax, wood, balsam of the desert, tin gold and various pastes made either by the operator himself or a manufacturer. "In art, truth is the means to an end." Is it possible that it is true that any or all of these substances are as good as any or all of the others? That does not seem reasonable.

But enough has been said to prove to the writer—whether it does to his hearers or not—that we are in need of much scientific work on the purely scientific side of our profession, and that the manual, or art side of it, sadly needs a scientific basis of "knowledge gained by systematic observation, experiment and reasoning." Now, before going further, and before some indignant brother accuses me of belittling my profession, of being a pessimist whose only effort is directed to besmirching the fair name of a beloved calling, let me state my position as clearly as may be. I realize thoroughly what has been done toward the solution of many problems in the past. I appreciate to its fullest extent the glorious work accomplished by Miller, Black, Kirk, Brommell, Cook, Andrews and a host of other truth-seekers. I concede fully and freely that the future will place the practice of dentistry on a much more firmly scientific basis than it occupies at present. I even acknowledge, with a contrite heart, how little I have personally done to add to the scientific facts on which our practice is based. All this is freely admitted. But here are these unsettled questions. What is the profession doing to solve them? What are *you* doing to add to the scientific practice of your chosen profession?

We are a great people and are making history in all lines of life; history that will be viewed with satisfaction in the future. The influence, power and capacity to deal with world problems, of the United States has gone forward by leaps and bounds during the past few years. Our progress in the sciences and arts has been no less sure if not so fast. But is the dental profession keeping pace with the high standard being raised in other walks of life? In

my opinion it is not. We need investigators, thinkers; men who will, by systematic observation, experiment and reasoning, add to the knowledge upon which the art of dentistry is based. There are not enough young men taking up this work. I can point to many isolated cases of capable men starting scientific work in certain lines, but their labors are spasmodic and the results fragmentary and of little value. There are a hundred young men in Indiana, each with time, income and intelligence enough to take up and follow out a dental problem to a scientific conclusion. Work such as is needed requires the sacrifice of much time and labor and some expense. The reward is the applause of your fellow practitioners and the satisfaction of work well done.

And now, Mr. President and gentlemen, in conclusion let me state that this paper was not meant for publication, nor is it a paper that I would present anywhere, except among the strict seclusion of Indiana practitioners, where my motives will not be misconstrued. No one loves the profession more than myself and no one is more jealous of our fame. All that I have said about our lack of investigative spirit I take to myself as much as I lay it to you. But my very love for and interest in dentistry causes me to make this earnest and energetic appeal for work of this kind. We are capable of better things and this crude paper can even, through the resentment of some hearer, cause definite work of an investigative nature to be undertaken, I will feel that it has not been written in vain. Give all honor to the seeker after truth. Science is truth, and without truth our beloved profession is but a trade, a handicraft, not a science and an art.

BACTERIOLOGY AND PATHOLOGY.

BY GEO. W. COOK, B. S., D. D. S., CHICAGO, ILL.

(CONTINUED FROM PAGE 251)

In the discussion of the typhoid bacillus and the bacillus of tetanus it was observed that these two micro-organisms were extremely different in the physiological and pathological activities.

Right in this connection we will discuss a micro-organism that has been investigated from its pathological standpoint by more bacteriological workers than any other micro-organism known to the pathologists. All textbooks on bacteriology and pathology give more space for the discussion of this subject than

is taken up in the discussion of any other bacteriological and pathological question.

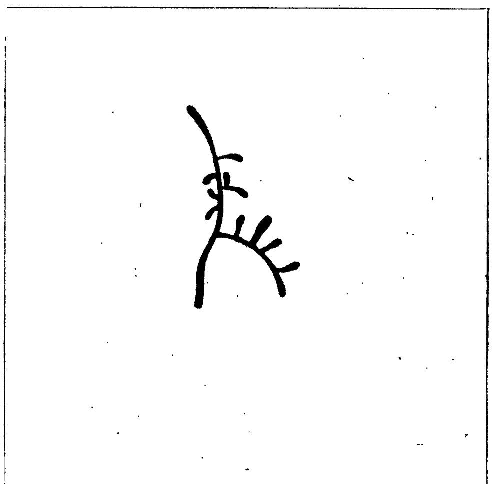
The tubercle bacilli was discovered by Koch in 1882. The probabilities are that there is no discovery in the science of bacteriology and pathology that has made so profound an impression upon the medical world. This discovery has not only determined the means whereby tubercle lesions can be differentiated from non-tubercle affections, but has pointed out the modes and means of infection, and has also given a true insight whereby this most dreaded pathological condition may to a certain extent prevent it. In 1843 Klencke made the statement that this disease had been produced in rabbits by the injection of tubercle material. He placed little importance on this discovery and considering it, as he said, only the multiplication of the tubercle cells in other animals. Vellemin published in 1865 his investigations in the infectious character of tuberculosis. His work was done in a very scientific and what proved to be a logical and systematic demonstration of the true transmissibility of this disease, not only from man, but also the tubercle nodules of cattle; thus demonstrating beyond question the infectious nature of this disease. His views were strongly attacked from various quarters, purely on theoretical grounds. But experiments later demonstrated that his observations were correct so far as the production of the disease in animals by inoculating them with tubercle material.

In 1873 Armanni succeeded in producing tubercle ulcers in the cornea by scarifying and then placing tubercle material on the scarification. He also found that this condition did not take place when using other material than that of tubercle foci. Cohnheim and Salomonsen took up this line of experiments and at first were inclined to doubt the truth of Armanni's statement of the infectious nature of the tubercle virus in the eye, for at first the inoculated cornea would heal over and would appear perfectly sound, though after twenty-five days the tubercle nodules would appear; the disease then gradually spreading from this small foci, completely envolving the globe of the eye and from this lesion the lymphatic glands become envolved and in a very short time the animal would die with general tuberculosis.

The nature of the tubercle virus was not known until Koch's discovery of the tubercle bacilli. This masterly piece of work will ever be referred to by those who are studying the etiological factors of this disease; when it is remembered the difficulties that had to be overcome in order that he might demonstrate the bacilli in the tissue and also the difficulty attending the isolation of the micro-organism and establishing its true pathological effect on the lower animals. He first demonstrated the micro-organism in the tissue by staining for twenty-four hours with a solution

of methylene blue and with the addition of costic potash; with this method he was able to demonstrate the presence of this micro-organism in this pathological lesion, which had so long baffled the best minds of the medical profession. His attempt at cultivating the organism on the ordinary culture media failed in every instance, but by a method which was original with him, that of solidifying blood serum, he was able to produce the germ in pure cultures from animals that had been inoculated and had the characteristic tubercle nodules.

When it is considered that the germ seldom or ever makes its appearance in artificial culture media before the tenth or



THE BUBIRCLE BACILLUS GROWING VERY MUCH AS THE ACTINOMYCE.

twelfth day, it is a fact which may account for its non-appearance on the ordinary culture media that was used at that time. This germ has been cultivated apparently with greater success on glycerine agar, which was introduced by Nocard and Roux. In this media the growth takes place a little earlier than on blood serum; it also grows more luxuriantly, but seemingly has a tendency of becoming more quickly non-pathogenic than when grown on blood serum. On ordinary agar-agar and gelatin media no growth has ever been observed, but it was found to grow on the true vegetable medium. This fact was first demonstrated by Pawlowsky; he succeeded in cultivating it on the potato, carrot and macaroni. Sanders used these last named substances for

making an infusion and then adding glycerine. He considered potato a much better media than the glycerine agar. The optimum temperature for the growth of the bacillus of tuberculosis is from 37° to 38° C. At a temperature from 40° to 42° C. growth is entirely arrested. Sanders found that the germ would grow at a much lower temperature than that above stated. He succeeded in growing the bacilli at from 22° to 23° C.

The tubercle bacilli has shown considerable power of resistance to external environments and seem to retain their physiological vitality for a considerable time outside the body and under various conditions, thus giving a strong belief that they are a spore-bearing bacterium, though no spores have been demonstrated as yet. While in many respects they resemble the spore-forming micro-organisms, still their resisting power is very much less than the true spore-forming bacilli. Dried tubercular sputum has been found to retain virulent germs from one to two months, as it is a well-known fact that putrefactive processes oftimes render pathogenic germs non-virulent when allowed to remain in this substance for any great length of time. The tubercle bacilli is but very little affected with such conditions, especially if this putrefaction is of mucous origin, coming from a catarrhal membranous exudate, for they have been found after several weeks of such putrefying substance. Fraenkel and Baumgarten have found the tubercle bacilli to live in the body of tubercular individuals after they have been buried in the ground from five to eight weeks. It takes about six hours to destroy their vitality by the action of the gastric juice. Their vitality is much more resistant in a dried than in a moist state, for it has been found they will resist a temperature of 100° C. for one hour if in a dried condition, while it only requires 70° C. in a moist state. Koch and Strauss both found that the tubercle bacilli is rapidly destroyed by the action of direct sunlight.

The action of tubercle bacilli on animal tissue has been extensively studied by a great number of investigators. According to the investigation of Baumgarten the tubercle bacilli acts as a cell stimulus to the fixed connective elements, thus causing a proliferation of the round cells, increasing the protoplasmic appearance to that of the epithelial cells; thus they are called epithelioid cells. These cells are usually possessed with a single nucleus and have but little power to take up a staining fluid that is ordinarily used in such investigations. The next step in the process is followed by an infiltration of leucocytes. This foci is soon surrounded with a small round cell, possessed with a nucleus that stains darkly, with the appearance of small protoplasmic bodies. Many of these round cells have a mononucleur and also some polynucleur cells. The number of these round

cells vary greatly in different instances. This leucocytic infiltration varies considerably under various conditions, for, as is well known, the appearance of the leucocytes is the action of the vascular system to the tubercle bacilli. Where these tubercular foci start in a lymphatic gland there is usually a greater number of the epithelioid cells than there is of the small round cells. When the tubercular nodules are formed principally of the epithelioid and lymphoid cells, there is to be seen with the naked eye small pearly bodies suspended in a grayish translucent structure without any apparent tendency toward the formation

THE MICROSCOPIC APPEARANCE OF TUBERCULOSES FOCI OF TONGUE.

of blood vessels, thus going on to a decided degenerative change; this is known as coagulation necrosis; and a fatty change takes place, followed by the formation of a cheesy material which has been designated as caseous necrosis, which is the true physiological activity of the tissue cells against the specific action of the external stimuli, which in this instance is the tubercle bacillus.

One of the first changes noticed in the cell protoplasm is rendering the cell incapable of taking up the stain, as it would under the ordinary conditions, and the appearance of granular changes in the protoplasmic and nuclear substance. This change will

continue until the outline of these cells become progressively more and more indistinct and less deeply stained and the necrotic change has advanced to a point where there is only the appearance of a conglomerated mass of debris. In the early stages of necrosis, where we have the epithelioid cells formed, there is a tendency on the part of many of these cells to fuse together, forming large, irregular cells; these are designated as giant cells, which is one of the important pathological characteristics of tissue degeneration, brought about by the peculiar pathogenic properties of the tubercle bacilli. It must not be inferred by this, however, that the giant cells are only peculiar to tubercular inflammation, for they have been observed in other specific inflammatory processes due to some chronic irritation. They have also been observed in tumorous growths, but it seems to have been the common observation to all investigators that the giant cells are more abundant in tubercular tissue changes than any other forms of inflammation where they have at all been present. It has been thought by some observers that the giant cells are the result of a rapid division of the nucleus in the epithelioid cells; others have considered that it was the running together of the leucocytes and the lymphoid element in the tubercle, thus causing the formation of the giant cells. The nuclear formation in these giant cells usually arrange themselves around the periphery, or if the cell happens to be elongated they may arrange themselves at either end. In the tubercular nodules where necrosis is rapidly progressing the giant cells quickly disappear; first, the granular appearance in the protoplasm and a rapid breaking down, with a complete obliteration of the giant cell. It sometimes happens that a number of these tubercular nodules will be forming near each other and eventually come directly in contact, and quite a large tumor may be formed.

In the lower animals, and especially in cattle, these tubercular tumors are by no means uncommon; they are usually formed on serious membranes. The name "pearly disease" has been applied to these pathological conditions. These tubercular tumors have been observed in the brain of human individuals. The tubercular bacilli, as has already been stated, can be demonstrated in the tissue. Sometimes they are observed lying between the epithelioid cells when first formed; as the disease progresses they are more and more plentiful, and the giant cells may contain a large number. After the tissue changes have gone on to a somewhat progressive state of necrosis, then there seems to be a diminution in the number of the bacilli visible in the necrotic mass. After the tubercular bacilli has found a lodgment in the tissue there is a great war takes place, the tendency of the tissue to prevent further invasion of the micro-organism

and the determination on the part of the bacilli to grow and produce its characteristic pathological changes. In most instances the bacilli will maintain its place in the tissue, and in the course of time there will be a secondary foci formed as the result of a germ or germs having been transferred from the primary lesion. The means by which the bacilli is transferred from the primary lesion is usually accomplished by the phagocytic activity of the leucocytes; in their effort to destroy their foe may transfer the micro-organism, either by the ameboid movement or they may be caught in the lymph stream and carried to some distant

TUBERCULAR ULCER MIKULTCZ'S ATLAS

part of the body, and are permitted to remain until another foci of infection is thoroughly inaugurated, and possibly through the same process another foci may be established, and another, and another, and so on until there may be a general infection throughout the body. When there are a great number of these tubercular nodules formed it is usually designated as milliary tuberculosis. When this general infection has been fully established the disease process usually runs a very rapid and fatal course.

It is pretty safe to state, however, that tuberculosis primarily is a local pathological process. Its effects are first the disturb-

ance of the functional activity of the tissue cells in the parts in which it is located, by the development of an intracellular toxine, which at present is by no means well known. In the primary local lesions there is found, as has already been said, a reaction of the tissues, which is caused by the chemotactic activities of the body substance of the bacilli themselves, which results in the same action against the invasion of the micro-organisms in the sue structure, thus forming a fibrous tissue wall that holds the disease stimuli in check. A degenerative change may take place in the tissue, which may result in the calcification of a part, thus entirely eradicating the cause of the disease. This condition has been more commonly found in the lung tissue. These observations were made at autopsies of cases having died from some other disease. The statement has been made that there are 66 per cent of human individuals that have either completely healed tubercular foci or have a latent infected lesion; secondary infection is about 6 per cent. It has been observed that healthy nurses and physicians of tubercular cases frequently have the tubercular bacilli in the nasal mucous. Apparently there is no tissue of the human body that is entirely exempt from the invasion of the tubercular bacilli. The entrance of the micro-organism may be in any part of the body, lungs, intestines or any part of the skin where the continuity of the tissue is in any way interfered with. Many authors are of the belief that the tonsils are a very susceptible receptacle for the lodgment of the tubercular bacilli in the crepes of these organs, and from there may be transferred to any part of the body.

Tuberculosis is quite common in most all domestic animals. It is frequently found in cows; it is more frequently found in old milk cows. It is said that 80 per cent are found to have this disease. In slaughtered cattle it is found that about 35 per cent are infected with tuberculosis; in slaughtered calves there is about 3 per cent, and in newly-born calves tuberculosis is extremely infrequent. It has been found that infection from man can be transmitted to cattle, swine, horses and especially to monkeys and guinea pigs; dogs can also be infected. Fowls are more or less immune. The embryo of chickens in incubated eggs may be infected; they show a chronic process of the disease, and the bacillus is present in considerable quantity. Giant cell formation is not very frequent in these cases. Birds are more or less susceptible to the tubercular bacilli. The tubercular bacilli that is found in the bird seems to have a different morphological and physiological appearance to that found in the higher animal. Maffucci and Strauss, also Kruse, were the first to observe this condition in birds, and at that time they looked upon it as a different specie of the tubercular bacilli as found in man and in other animals. But experiments later by Kruse and Pan-

sini, in which they inoculated guinea pigs from tubercular organs of cattle and from infected human sputum other guinea pigs were inoculated. From these infected animals they obtained bacilli that were identical of the tubercular bacilli of fowls, which proved to be infectious to chickens and, as has been stated, are considerably immune to the action of the tubercular bacilli when directly injected from human sputum. The bacilli of fowl tuberculosis are non-pathogenic to the higher animal organism when injected directly from the fowl into the higher animals, but if they be cultivated on artificial culture media for considerable

TUBERCULAR FISSURE OF TONGUE MIKUKTCZ'S ATLAS

time at 37° they become pathogenic to the animals that were previously immune. Cadot, Gilbert and Rogers found that they could convert these varieties by changing them backwards and forwards for a few cultivations, thus proving conclusively that they were certainly one and the same micro-organism.

The tubercular bacilli seems at times to change their morphological appearance, for it has been found after the injection of rabbits in the kidney with pure cultures; after about fifteen days they will grow in long branching thread forms; the terminal ends becoming somewhat club-shaped, the morphology of which is

almost typical with that of the actinomyces, but their staining properties differ, especially the club portion from that of the tubercular bacilli of the actinomyce, inasmuch as the stain with the gram method of the actinomyce does not retain the stain with the gram method. This variation of form and the variation that exists as regards their pathogenesis may have a greater influence on the pathological phenomena of this disease than is at present recognized among the majority of thinkers on this subject.

Tuberculosis is probably one of the most universal diseases known to the human race. It has been estimated by Vaughan that 150,000 die annually in the United States of tuberculosis, or one in every sixty in the population of the United States. Osler says there are three means of hereditary transmission of tuberculosis—transmission by the sperm or by the ovum and transmission through the blood by way of placenta. Gartner demonstrated that congenital tuberculosis can be produced experimentally in mice by inoculating the mother with tuberculosis. The observation has been to the effect that congenital tuberculosis in human individuals is a very small percent. There is considerable difference in the inheritance and the transmission of the disease to that of a predisposition to the disease. Everyone is more or less exposed to the infection and may acquire it, even in the very earliest childhood. The belief in the contagiousness of tuberculosis has existed for a great many centuries. The tubercular bacilli has been found in the dust of rooms and frequently by tubercular patients; this is probably the greatest means of dissemination of the bacillus, is by the way of dust, which is one of the greatest problems the scientific sanitation will have to overcome before this means of infection can be reduced to anything like the minimum.

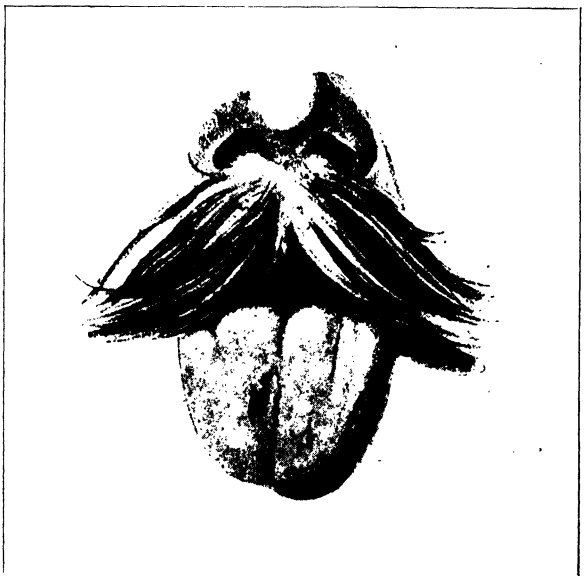
It has already been stated that all of the tissues of the body have been known to be affected by the germ of tuberculosis. As the oral cavity is the main gateway to the internal organs and cavities of the body, it is extremely surprising that tubercular infection has not been more extensively observed on the oral mucous membrane of various parts of the mouth. Michelson has found that tubercular lesions of the oral mucous membrane may follow lupus of the external skin, differing somewhat from the general characteristics. The primary lesions of the mucous membrane following lupus is usually on the free borders of the lip, gradually progressing over the upper jaw, and progressing from thence over the hard and soft palate; owing to the fact that the condition is not painful it may go unobserved for a number of years. The general characteristics of these lesions are to be

recognized by a great number of nodulary formations along the mucous surface, having a bluish tinge to the mucous membrane. These nodules sometimes become a yellowish color, a slight abrasion of the epithelium covering these nodules may cause suppuration and the formation of a small ulcer. If a number of these milliary nodules become ulcerated they break down and form a large ulcerative surface. The margins of these ulcers are thin and jagged and sometimes show more or less prominence. The floor of this ulcer seems to secrete the yellow exudate which dries upon the surface, and underneath this crust there may be a little pus forming foci. Around this large ulcer, and no great distance from its margin, may be seen a great number of these small nodulary excrescences formed, and these will eventually become broken down and add to this already ulcerating surface. It has been observed by some authorities that parts of these ulcers will show a tendency to heal, and it is barely possible that in many instances there has been a spontaneous restoration of a part to a healthy condition. If this ulcerated condition continues for any great length of time the deeper tissues may become involved and finally reach the periosteum, and a superficial disintegration of the bony structure will be observed; this condition may continue until a sequestra is formed, and the gradual disintegration of the bony substance will continue until the bone is completely destroyed around the roots of the teeth. This condition of tuberculosis of the mucous membrane has been observed to follow almost the identical course of lupus of the skin, continuing as a rule for many years. It may start at childhood and go on for several years and then become almost or entirely arrested, and remain that way without making any of the oral manifestations of the disease process, but from some changed condition of the constitution it may arouse from this latent state and become a general disease process, and assume its original condition that existed years before. Mikulicz and Kummel say that this pathological lesion frequently makes the secondary manifestation after the extraction of a tooth. This condition usually comes later in life. In those conditions in which tubular lesions exist in the mouth there is usually found large lymphatic glands in the submental regions and angle of the jaws. Sometimes the glands far down the neck become enlarged; the pharynx may become involved; the palate and the tonsils frequently become involved in this process. Michelson states that the nose may frequently become involved when there is any extensive lesions in the oral cavity. In the severe forms there may be a great loss of tissue,

and where the palate becomes involved a rather large opening in the palate may be formed. These lesions have been mistaken for syphilitic lesions. I have had the privilege of seeing two cases, one in which the buccal mucous membrane was considered involved; the other was one that had suffered almost the entire loss of the soft palate. The first case was a man 31 years of age, and had been a patient of mine for 4 or 5 years. His teeth and mouth had always been in fairly good condition. After an absence from the city for almost a year he came to see me, stating that for two months he had had a sore mouth; on examination I found an ulcerative surface almost the size of a silver half dollar; it had not been painful, he stated, except at times when something irritated it; it gave him more or less inconvenience. I treated this for some little time, but it did not yield to the treatment. I informed him that he better see his family physician. At the time I was treating him I made a great number of microscopic slides from the lesion, all of which were stained for tubercular bacilli, but revealed nothing of a tubercular nature, and then came to the conclusion that it must be syphilitic and belonged to the province of the physician rather than that of a dentist, but I told him that I would like to keep track of his mouth. At his second visit to my office I took some of the scrapings from the ulcer and inoculated a rabbit and guinea pig. At the fourth week the rabbit had begun to show signs of sickness and at the fifth week it died; a post mortem revealed the fact that it had milliary tuberculosis; tubercular nodules were found in the abdominal cavity; the spleen was specially involved. At about the time of this development his physician had come to the conclusion that there was a tubercular lesion in the lungs. After the death of the rabbit the guinea pig also died, showing practically the same pathological changes as in the case of the rabbit. I knew that there must be tubercular bacilli in this lesion and I devoted myself to making slides from this ulcer; in 119 slides I demonstrated the presence of the tubercular bacilli. Eight months from the time the patient first appeared in my office he died with tuberculosis of the lungs. Incidentally we might mention here that his wife, who nursed him during his illness, has tuberculosis of the left tonsils, without the slightest evidence of any other tubercular lesion.

The case of the tubercular palate was a gentleman, who was sent to me by a physician who suspected there was a tubercular foci in the lungs, but had been unable to demonstrate the presence of the tubercular bacilli. The patient had a small indurated

ulcer on the left palate, on the left side of the medium line, and extending almost to the third molar tooth. Scrapings were taken from this ulcer and four rabbits and guinea pigs were inoculated. Many slides were made and stained for tubercular bacilli, but we did not succeed in finding bacillus of tuberculosis; there was constantly present a tetrococcus, which was isolated on glycerine agar media and inoculation was made into rabbits, which caused large abscesses at the point of inoculation. In the meantime one of the guinea pigs died with some appearance of tuberculosis. At four weeks after inoculation, directly from the ulcer, the second



TUBERCULAR LESION OF GINGIVI. MIKULTCZ'S ATLAS

guinea pig died from tuberculosis, and the tubercular bacilli was demonstrated from a large nodule found in the abdominal cavity. The physician and myself had sought in vain to demonstrate the presence of the tubercular bacilli, both from the sputum and the ulcer on the palate; from time to time we could demonstrate this tetrococcus form from the sputum. The man was recommended a higher altitude. He went to Colorado and remained there for about 6 months. Just before leaving for Colorado I thought that this ulcer showed signs of healing. He had been

treated by his physician for syphilis but it seemed to have no effect. On his return from Colorado the ulcer had practically disappeared and he remained in Chicago 12 months, when a well defined tubercular infection developed in the lung; almost at the same time this ulceration reappeared on the soft palate, and by curetting rather heroically, we were able to find the tubercular bacilli; an inoculation into the rabbit from the ulcer resulted in the death of the animal from tuberculosis. The patient left Chicago, and has remained the rest of his time in a high altitude, most of which has been spent in Colorado, where he now lives.

In the winter of '93 and '94 I took up a matter of investigating all lesions of the mouth and face, and especially badly decayed lower molar teeth, until I had made an examination of over 200 mouths, and in all cases of suspicious nature inoculations were made into rabbits and guinea pigs for the purpose of demonstrating if possible the presence of tuberculosis. The detail of this work was reported to the Chicago Dental Society in '98. I demonstrated at that time to my own satisfaction that the tubercular infection could and did take place through badly broken and decayed teeth. Some reviewers of my work at that time and especially those in Scotland misinterpreted my explanation as to how these micro-organisms might pass through the pulp canals and infect the lymphatic system. They hardly thought it possible for the tubercular bacilli to pass through the healthy pulp of the tooth. This is not the meaning I wish to convey, but that the pulp had undergone decomposition in the pulp canals and nothing remained there but the decaying debris of the dentine of the tooth, and such particles of food and other substances that might lodge there. Some of these cases had, so far as we were able to determine at that time, no signs of tuberculosis in any part of the body; whilst others did have the characteristic symptoms of tuberculosis, so far as I was able to follow the history of these cases, 8 out of 9 developed tuberculosis; 4 within a year after my finding, 2 in about 18 months, and there was 2 that did not develop the disease for over 2 years; 2 cases were lost sight of entirely.

Until the publication of this paper there had apparently been but little thought given to this avenue for tubercular infections. Since that time thoughtful students of medicine have considered this stage of the subject in a very much more serious light than it had been at any previous time, and today I believe that the possibilities of infection of such diseases as tuberculosis is far

greater by way of badly decayed pulpless teeth, than by the tonsils, which has been considered one of the principal avenues leading to lymphatic infection. Since the report of these cases I must here mention very briefly another case that came under my observation. A woman 32 years of age, living on a farm, noticed an enlargement on the right side of her neck just at the angle of the lower jaw. After consulting a number of physicians she was sent to Chicago and was operated upon for tubercular glands of the neck; they reappeared in 5 or 6 months, and a year from the first operation she was operated upon again for the third time. She complained at the time of having had several years before a badly abscessed tooth, and from time to time she had a soreness along the borders of the lower jaw. After the third operation for this glandular trouble she by accident through an acquaintance of hers, who is a patient of mine, came to see me in regard to her teeth. On examination of her mouth I found that she had lost her first lower molar, on the right side; the second and third were badly decayed. I found a badly diseased condition of the bony structure around these teeth; the second molar was badly decayed and the pulp had evidently been dead for some time. A thorough examination for tubercular bacilli from the debris removed from the canals of this tooth failed to demonstrate any tubercular bacilli. Inoculations were made into rabbits and guinea pigs, resulting in the death of the animals from a general septicaemia. I studied the case some little time before extracting the teeth; they were then removed, to find that the outer plate of the lower maxilla were badly diseased, and some considerable necrosis extending almost the entire width and depth of an area of an inch in length. The deceased bone was removed; we then demonstrated the tubercular bacilli, both microscopically and by inoculations. Three lymphatic glands became enlarged four months after this operation, just beneath where we had removed some diseased tissue; these glands were then removed by her surgeon, and so far as I know, there has been no farther development of tuberculosis in this case.

The pathological appearance of the tongue has been observed by a number of investigators, and it was considered until quite recently always a secondary infection; but primary lesions have been observed on the tongue. Butlin and Spencer has called attention to the fact that microscopic demonstrations show that tuberculous fissures, nodules, cold abscesses and ulcers are not uncommon, and if handled in the proper manner at an early ap-

pearance of these local affections the spread of the disease to other parts of the body they have included all those pathological lesions known as strumous and lupus ulcers, which has heretofore been looked upon as having no connection with the tubercular infection. Tuberculosis of the tongue frequently appears as a fissure or as nodes and nodules. The general characteristics of the nodulary appearance is usually a yellowish tuberculous formation with rounded points projecting into a sharp point; these small yellowish nodules are formed by an aggregation of tubercles, varying in size from a pin point to a pea. The case that I had the privilege of studying, when the patient first came under my observation, there was along the side of the tongue a number of these small nodules, and in the course of a few weeks they broke down into an ulceration. The physician that had charge of the case decided that it must be syphilitic and at once began a syphilitic treatment, which had no effect upon the lesion; we then decided that it must be either cancer or tuberculosis. We made a number of scrapings and in vain sought to demonstrate the presence of tubercular bacilli; then we succeeded in getting enough tissues to make some microscopic slides, and finally succeeded in bringing to view the giant cells. I have here reproduced a micro-photograph of a section from this case. It will be seen a somewhat spherical mass of infiltration of the flattened epithelium cells, which extend out into the muscle fibers. Many times when there is only a small particle of tissue obtained, or the scrapings from these ulcers, when it is used for microscopic purposes, they may be mistaken for a cancerous growth. It seems that very few bacilli exist in tubercular lesion of the tongue; however, in this case, we succeeded in producing a tubercular nodule by implanting a piece of the tissue in the abdominal cavity of the guinea pig. It is well to state here to all appearance this was a primary lesion, for no other pathological processes were observed in this case. The man is now in Mexico, apparently in good health.

I have here reproduced some cuts from Mikultcz's atlas which gives by far a better illustration of the conditions, and better than anything I could say on the subject. As I have said on a a previous page that this condition is attracting more attention than it has heretofore. When the pleomorphism of the tubercular bacilli is better worked out it may reveal some very interesting facts as regards the pathological lesions found in the oral cavity. I have here given illustration of one of these forms that

Hayo and Bruns called attention to, as the variation from the bacilli or rod forms as usually found in cases of infection; it resembles in many respects an actinomyce.

HANDICAPS AND AIDS IN PROFESSIONAL CAREERS.

BY D. S. HONTZ, D. D. S.

Read Before the Northern Indiana Dental Society, Sept. 24th, 1902.

I believe all who have given this subject a moment's thought will agree that to thoroughly cover the ground implied in this title would require a paper too long to be read at a dental meeting; therefore it is not hoped that any phase of the subject will be exhausted, but rather to cover the ground in a general way, so that a thorough discussion may be awakened. If this is attained I will feel amply repaid for this feeble effort. In the first place, a thorough preparation for a chosen profession is necessary. First, a literary or general education is to be desired. Those who have had advantages in this way will certainly possess advantages over those who have not. General education gives prestige and standing in the community and enables the possessor to mingle with and hold prominent places in the society of the educated and best people of the locality.

The professional ability of a man is often judged by what he knows about other things. It is quite natural for inquiring minds to seek a professional man for information on any subject and to be able to give the desired information will certainly raise us in the opinion of the public. The man who does not possess such an education will most surely be handicapped by the lack of it. However, education in a general way, while being an advantage, is not an absolute necessity to success; but to succeed in the fullest sense does require that the special education be complete. He who goes forth from college with a full understanding of every detail of his chosen work will, all other things being equal, achieve greater success and rise above him whose only desire and accomplishment was to escape being plucked. To have mastered the science and art of dentistry means that there has been application and hard study. By this application studious habits are formed which are essential to success. One will not only go forth prepared to meet the trying realities of a professional career, but carries with him habits and desires which will cause him to advance and keep pace with the progress of this great profession. On the other hand, he who slights his preparation and whose only desires

were to pass the examinations will enter his professional life with an inclination to slight his work and do things in a manner just so they will pass. This difference in students and practitioners is possibly due to natural propensities; then fortunate is he who has a desire for knowledge and to rise high on the ladder of fame and usefulness in his work. After having finished the preparation for a profession the location will have much to do with success. We who are located in small country towns are deprived of many advantages which you enjoy who are located in larger cities. In small towns we miss the local dental society, the heart-to-heart talks which we would be glad to have with our professional brothers. We may have no electricity, gas, sewers and many other things of which we could make use. We cannot leave a patient in the chair while we run over to the dental depot to secure a special instrument or appliance or to match a tooth, but must make the most of what we have at hand. Another way in which the practitioner of the country town is handicapped is the lack or scarcity of patients who appreciate their teeth. By this is meant those who are not willing or able to pay for expensive means for their preservation. If a tooth can be filled for fifty cents or a dollar, all right; but if the expense is going to be several dollars, oh, my! Pull it out. Thus you are many times deprived of the business which not only pays best but enables you to become skilled in the more artistic kinds of work. Of course, there are people in every locality who do appreciate their teeth and are able to pay for whatever is necessary for their preservation, but this class is small compared to those of the city. Then again, your patronage may be scattered for a number of miles in all directions, and circumstances are such that they cannot call when you would be pleased to have them. For this reason we are often compelled to modify the treatment in various ways. On many occasions I would have been glad to have called the patients up on the telephone and asked them to come down for a few minutes, but, alas! they were six or eight miles in the country and the mud or snow knee-deep.

I feel it necessary in every case to try a set of teeth in the mouth before finishing, but in the country this is sometimes impossible. Another means by which we are handicapped in the dental profession is the ignorance of the people as to their teeth. This is notably true as to the temporary teeth. Most parents think the sooner they are lost the better, and much harm is done before the dentist is consulted. While speaking of the ignorance of the people I wish to relate the circumstance of a young man who came bustling into the office, and, seating himself in the operating chair,

said: "I want these two teeth filled. I've just got twenty minutes. One of them has been aching for two or three days." There were other patients in the office at the time, for whom, I told him, I must work at that hour, but if his tooth was aching I would take time to do something for his relief, but he must call at another date. A lack of means handicaps many young men upon entering a profession. They will have to get along without many of the conveniences and desirable appliances for a while, and his office will necessarily be very modest. Some may have become anxious to pursue a line of original research, but, having spent all their money at college, and, possibly, leaving college in debt, are forced to forego the gratification of this desire. I know that it is said, and truthfully, that most of the brightest men in all professions come from the poorer classes, or people of moderate means. While this is true, it might have been possible for them to achieve greater heights or to have reached the summit of their greatness earlier in life if they had possessed the necessary means to aid them.

Lastly, and most important of all, is affability and tact. He who possesses these qualities will succeed, even if he be lacking in many other things. Some natures tend to repel the public, others to draw everyone they meet into close friendship. Some can make themselves so agreeable that nearly everyone they meet will want to see them at every opportunity; others are just as sure to conduct themselves in such a manner that the second meeting of a stranger must be forced. These are natural propensities, and those who do not possess tact and affability should cultivate them, for they are great aids in a professional career.

I thank you for your patience during the reading of this hurriedly written paper, and sincerely hope that it may awaken a discussion that will be as free to criticise as to commend; in that event some good may come from its having been read.

SOME OF THE CAUSES OF IRREGULAR POSED TEETH.

BY C. BLAIR BLACKMAR, D. D. S.

Read Before the Central Michigan Dental Association at Ionia, Mich., October 2d, 1902.

Ever since your president asked me to write a paper for your meeting today I began to wonder just *what* branch of orthodontia would interest *you all* the most. I feel, the more I study it, that there is more to orthodontia than is usually recognized by the average practitioner. Beginning with the causes and ending with

the remedies means a long, hard study and battle. I concluded at last to give to you a few thoughts on the causes of irregularly placed teeth, because I thought you might be more interested in detecting the causes and offsetting the effects rather than in hearing about bad, pronounced cases and how they were corrected. I concluded you would also be more liable to attend to some of the cases *just commencing* to be irregular in your practice rather than to send the cases to some orthodontist because you are not near one.

What is orthodontia, It is, according to Dr. Angle, "that science having for its object the correction of *mal-occlusion* of the teeth." It is a study of *occlusion* of the teeth. I wonder if you really know how few of your patients have normal occlusion of their teeth. I made the assertion at Three Rivers last month at the meeting of the Southwestern Michigan Association that not *one in ten* of our patients enjoyed normal occlusion. And Dr. Cigrand, in the discussion, said that he thought I was very liberal in my statement. I wonder if you all realize how much less teeth would decay if they occluded properly. I wonder if you know the amount of harm it does to a normal masticating apparatus to extract even one tooth. Do you know how much a perfect masticating apparatus is needed by so many of your patients? Do you know that the most perplexing cases an orthodontist has to remedy are those in which some physician, or even a dentist, has extracted some of the permanent teeth? Think of the many cases you have seen where the temporary teeth have been extracted too soon, and then later see the permanent teeth struggling to take the places intended by nature for them to take. I wish I could influence every one of you to notice the importance of the first permanent molar, the six-year molar, in its use in keeping the other teeth in normal occlusal relations. And to notice the sad havoc its removal makes. The temporary teeth were designed for masticating food and for assisting in a mechanical way in the development of the alveolar process and jaws.

It should be noticed that the interdependence of the teeth is so great at all times that the loss of one or more at any period in their history must have a marked influence upon the remaining teeth in regard to the position they take in the arches.

Each tooth has its individual part to play in occlusion, and the loss of one tooth is a serious matter. The loss of the lower first molar often has a marked evil effect. It should be preserved as long as possible. So often the remaining teeth, in attempting to fill the space occupied by the first molar, fail to occlude in any satisfactory manner, and the perfect masticating apparatus is spoiled.

You might ask, Why are not the temporary teeth more often irregular in position? Among other reasons are the facts that the jaw at birth has developed sufficiently to accommodate the temporary teeth; also that they erupt from before backward in almost continuous order, and that the nose, throat and jaws have not taken on a diseased condition.

Now, seeing I am trying to show you some of the causes of irregularly posed teeth, and to show you some ways of offsetting this unfortunate condition by stopping the causes, I cannot call your attention to anything more interesting, it seems to me, than to some of the pernicious habits which cause mal-occlusion of the teeth. You certainly can never do anything of more benefit to your little patients than to show them the effect of the habits and to help them to break them. You should recognize the thumb-sucking child by the protruding upper front teeth, usually to *one* side, and receding lower teeth, made by the pressure of the thumb. Again, let us notice the effect of lip sucking, the lower lip usually. The lower lip abnormally developed, extra full, the upper front teeth tipped out and up, the lower depressed. Then notice, please, the tongue-sucking child. The tongue is usually placed between the front upper and under teeth, forcing the upper up and the lower down, leaving an elliptical space between the front teeth. I have been surprised to see how little the general practitioner notices these conditions, and so much more surprised to know that mothers so seldom know their children have the habits at all. And right here let me say that these preceding causes of protruding upper front teeth must not be confounded with those cases caused by a continual breathing through the mouth instead of the nose, because you can see that a lip, tongue or thumb sucking child cannot breathe through the mouth at the same time it is sucking. Mouth breathing is not a habit but a necessity. The mouth breather is thus never a thumb, tongue or lip sucking child. And now I am to the subject of mouth breathing, and if ever a dentist can do good to humanity it is when he notices patients who do not breathe through their noses and refers them to a good rhinologist, a specialist who makes a good breathing passage through the nose by removing abnormal growths and then by soothing solutions to the nasal membrane heals it and gradually breaks up the mouth breathing habit. You are thus often able to *offset* at the start a mal-formed condition of the mouth and a mal-posed set of jaws. Every child should breathe through its nose. A little nursing babe will often cry and be so irritated because it has not had proper protection from colds and so cannot nurse and breathe at the same time, as you readily see.

Later in life the child, if not taken extra care of, will breathe through its mouth continually from necessity. I never have seen a more thankful and appreciative class of patients than those for whom I have called attention to the facts of pernicious habits and mouth-breathing. One little patient who had not breathed through its nose for some time and had adenoids and enlarged tonsils, said to me a week after it had taken chloroform and had the operation performed, "Mercy, but that chloroform makes my nose and throat feel airy." A prominent lawyer said to me once after sending his child to a rhinologist: "Why, doctor, your advice to us to send our child to a nose and throat specialist was worth more to us than all the doctoring for years we have done for his colds, throat, etc., and he was growing worse all the time and his teeth so crooked." What does mouth breathing do to the teeth and jaws? How shall we detect it? etc. Harmony in one's surroundings is said to be heaven. Now, mouth breathing breaks up a whole lot of harmony. It is so easily recognized and a familiar sight to us all. The small nose, small nostrils, the vacant, idiotic look, the short upper lip, open mouth, mal-occlusion of the teeth, abnormally formed jaws, etc. The lower jaw is distal in its relation to the upper. The upper arch is narrowed, lengthened and protruding upper incisors and lengthened lower incisors. The almost constantly open mouth. The upper lip is short and undeveloped. All this causes inharmony in the forces governing the normal placing of the teeth. These forces are tongue pressure from within the arches, lip pressure on the outside of the arches, the biting together of the teeth often, so the occlusal inclined places will force the teeth into place. I wonder if we realize the force exerted by these inclined planes to keep the teeth in position. The *causes* of irregularly posed teeth should be removed *first* and the *results* remedied *later*. Many dentists think they have no time to study out these mal-occlusion cases, which must be very true; and in such times he should send the cases to a specialist and take his remuneration commission from the orthodontist for referring the patient, which often, and usually is, more in dollars and cents than the general practitioner could get from the patient if he attempted to try to do the work himself, and he then avoids trying to do something he is not at all familiar with. A dentist should recognize that the mal-posed, crowded teeth are so liable to have pyorrheal conditions about them. He should also recognize that teeth decay most where crowded, and that if teeth were straightened, *after* they were filled even, the fillings he put in would stay in longer and do better service in avoiding uncleanliness and decay. In other words, a set of teeth occluding normally will

keep clean and be nearly free from decay, if not quite, especially when nicely filled, where defective in structure. Every child should have its teeth put in normal occlusion. And the dentist should notice whether this condition exists in the mouth of everyone he works for or notices, and if he is not able to remedy mal-occlusion, he should send the child to someone who is. I noticed lately in a *Free Press* article on "Art and Artists' Ideal Faces," which started out by saying that beauty was only an expression of the divine. Whoever could imagine an angel with an ugly shaped face? We are taught often that we shall recognize faces in heaven as they were on earth. And just think of it, gentlemen, what a homely lot of angels we are allowing to go to heaven by neglecting to do our duty to those with crooked jaws while they were with us on earth. And if the supposition be true, that only the beautiful are allowed in heaven, please realize the great number of children you are barring out.

THE TECHNIQUE OF GAINING ENTRANCE TO PULP CHAMBERS AND ROOT CANALS.

BY L. P. HALL, D. D. S., ANN ARBOR, MICH.

In presenting this paper it is not with the hope of bringing out anything new or unexpected. It will discuss methods of treating teeth only so far as they may effect the opening of cavities or canals. We will suppose that the teeth are already devitalized, and that a rubber dam has been placed on the teeth wherever possible. If the tooth is very sore we may not need a dam the first time, as all we can probably do will be to give relief, and perhaps syringe it out. But when the treatment is begun the rubber dam is certainly needed. The dam saves time, prevents the entrance of things you do not put in yourself and gives a clean, dry view of the work. No wonder we hear patients say a tooth has been treated for so many months or a year when the operator has poked his treatment through saliva and debris all the time, very likely never having seen the canals or knowing surely how many there are.

There are places where the rubber cannot be used. There are cases presented, for instance, in which it is almost impossible to keep the saliva out because the decay reaches so far beyond the cervical margin. In these cases it is possible to fill that portion at once with a temporary stopping of cement, amalgam or gutta-percha and make a new opening through the crown for treatments. In that way only one tooth need be covered for treatments, and that with ease and no time lost.

Frequently there are patients who can be relied upon to keep a cavity dry for change of treatment, but in most cases it is far better to use a dam.

As frequent reference will be made to the use of the Gates-Glidden drills, it may not be amiss to say a few words as to the proper way to use them. We will all agree that they are not to be used except with care, never forced and frequently withdrawn and cleaned; the pulp canal as well must be cleaned, so that no debris is forced through the apex. Whether used in the straight hand piece or right angle, there should be a large, a medium and a small drill. Which shall we use first? The advertisements usually say the smallest, following with the next in size, until you have made the canal large enough.

Now, do just the reverse and you will break fewer drills, use them more and to better advantage. Why? Because the canal or root as it leaves the pulp chamber is largest just there and will stand more reaming. There is nothing to bind the largest drill at this point. Then after the first cut there is a sufficiency of room in which to work the next size without binding. Do not think it necessary always to drill out a canal to the apex. Sometimes to merely countersink or funnel out the mouth of the canal is all that is required. If the canal needs much reaming out, find direction and length by using a very fine plain broach or explorer. The size of the crown may indicate the size and length of root, but from careful study and examination of large numbers of teeth the frequent fallacy of this is seen.

When a broach is passed through the apex of a root the sensation experienced is like a pin prick, while if it touches a portion of nerve in the canal it will be more acute. Sometimes a broach so fills a canal that it acts like a piston and air and debris are forced ahead; this causes pain. A more slender broach will pass much farther, with no pain.

To begin with the simpler and most easily entered tooth, we will first consider the superior incisors. Usually there is a filling or cavity on either the mesial or distal side, rarely one of sufficient depth on the labial. If a filling and a good one, leave it intact and open on the lingual surface in the fossa. If a cavity and of such shape and size as will, with slight enlargement, permit the passage of broaches and other instruments directly into the canal, its orifice will be sufficient.

Place the rubber dam on three or four teeth in such manner that the cavity will be about the middle of the teeth covered. Then cut away all thin walls and excavate from cavity all debris. Next,

with either burr or drill, ream out, if necessary, that portion of dentine between canal and cervical border of cavity sufficiently to allow free access with probe or broach. Now cleanse the canal of all debris of whatever character, being careful not to force either instruments or debris through apex of root. If canal is of usual type, no further reaming will be necessary. If much reduced in diameter either a three or four sided twist hand broach of a Gates-Glidden drill may be used.

The twisted broaches as now made will cut out where the walls are not too hard, and the slender points will easily follow the curves usually found in these roots. Seldom is it well to force a drill to the extreme apex. Rather cut only enough to permit the free passage of broaches or probe with cotton for carrying medicinal agents or for drying purposes.

If, however, the operator expects to make use eventually of the canal for pin of crown, it is advisable to so ream out the canal that it will admit a fair sized platinum pin before filling, as it is more readily done while you have in mind the general shape and direction of canals than to trust to memory and follow only a slender point of gutta-percha, or whatever is used as the filling material.

An incisor is occasionally presented in which there are either no cavities or the fillings are well made. In these cases it is, of course, best to open from the lingual side and in direct line with the long axis of the tooth. In case the tooth is very sore to touch, only the smallest and sharpest drill should be used; when it is once started an even, steady pressure should be maintained. Once through to the pulp chamber, or as soon as this venting will permit, the opening should be enlarged so that not only will good, free access be obtained to the canal, but also to the fan-shaped pulp chamber, that all debris may be removed from the crown portion of the tooth.

Superior cuspids may be entered in much the same manner. Usually they are entered from distal cavities, and if so the cavity should be extended well to the median line on the lingual side to avoid bending or binding of instruments. It must be remembered that these teeth have much longer roots, and, though usually straight, they may be much curved, even a right angle curve near the apex. As they have large, strong roots, they will stand much reaming two-thirds of the way to the apex. Beyond that care must be exercised lest the drill be forced through the side of the root. A very fine spring-tempered probe may find the way through.

The first and second bicuspids are usually entered through proximal cavities. Either mesial or distal cavities, especially the

distal, should be opened nearly to the center of the crown upon the long axis of the tooth, so a broach or drill will not be bent unnecessarily. The floor of the cavity should be opened sufficiently that no under cut remains between the cavity and pulp chamber.

In the first upper bicuspid there are almost invariably two canals, if not two distinct roots. In the upper first bicuspid we have the pulp chamber more or less distinct from the root canals. These canals are situated at the extreme buccal and lingual sides of the pulp chamber, are usually quite slender and may be difficult to locate. A safe method is to use a rather large, round burr and cut a clean base to the pulp cavity, carrying well to lingual and buccal, and removing all sharp edges and overhanging shoulders of cavity opening. A minute smooth broach will usually locate these canals and give a fair estimate of curve, length and direction.

The canals being located, they may now be opened with large Gates-Glidden drills, following with the next size, until the canals are well opened. In the second bicuspid the pulp chamber and canal are less distinct, as the single canal is usually larger and extends from buccal to lingual of the chamber.

A bicuspid pulp sometimes dies after the tooth is well filled, or even when there is no cavity. In that case the tooth should be entered through the center of the crown with a small, sharp, plain drill, and this opening should be so enlarged that every portion of the pulp chamber may be cleaned. This opening is frequently made too small to allow of good access.

The buccal roots of the upper molars and the mesial roots of lower first molars probably present the most difficulty.

A study of the anatomy of the teeth gives us some guide. In the first upper molars the roots are normally well apart, the anterior buccal root leaving the neck of the tooth as an extension of the mesio-buccal cusp or lobe, and curving to the mesial; while the disto-buccal root leaves the neck of the tooth as an extension of that lobe or cusp, but in a distal direction. The apices of these roots may turn toward each other more or less. The lingual root is larger and projects well into the palate.

In the second molar the buccal roots are closer together and leave the neck of the tooth on more parallel lines, though both may curve distally. The lingual root does not spread away so much to the lingual, and any two or possibly all three roots may unite.

In upper molars with fair sized mesial cavity there is no great difficulty of access, the main hindrance being in reaching the anterior buccal canal. Too often the posterior canal is mistaken for the anterior. If there is trouble in reaching this canal through the

mesial cavity, how much more is there if we work through a distal cavity? Now surely we must open well into the crown of the tooth, even though we sacrifice a considerable portion of good tooth substance. All overhanging shoulders and undercuts must be cut out or beveled to orifice of main opening to enable operator to see every portion of floor of cavity, especially to openings of canals.

If there is no proximal cavity, gain entrance with a sharp plain drill from the mesial side and toward central portion of crown and enlarge this. If there is either mesial or distal cavity, open from this to central portion of crown. In either case, *open.* Too much stress cannot be placed on opening.

In either upper or lower molars good access to pulp chamber may be had through large buccal cavities by extending into crown. If buccal margin is low, build up temporarily to hold dam. Having opened well the orifice through which to treat, excavate and cleanse. Now locate all the canals with a fine broach; in normal teeth the lingual is easily found, and so perhaps is the disto-buccal. *The pulp chamber is usually located partly in the crown and partly in the neck* of the tooth, so that the anterior buccal canal may be beyond neck of tooth and in curve of root, *hence far forward.* If only one buccal canal is found, note its direction with regard to supposed direction of buccal roots, and then with a *large,* round burr in either a straight or right angle hand piece cut out in the direction the canal should be. Blow out chips and examine frequently with broach. *Never use a small drill* or *small bur* for locating a canal; there is too much danger of going in the wrong direction, and if a deep cut is made next to canal it troubles constantly when you pass into the right one. The orifice of the canal opening from the pulp chamber may be round or flattened, large or small. If small and either round or flat, its orifice should be enlarged with largest Gates-Glidden drill, that instrumentation or treatments may be easily made. The rest of the canal may, if necessity demand, be enlarged with the next sized drill until it can be cleansed and treated with a fair degree of ease and certainty.

Lower first molars are perhaps more trying than the seconds, as their roots divide closer to their crowns, and the mesial root, as it leaves the neck of the tooth, usually slants first to the mesial from pulp chamber, thus bringing the openings of the canals well under the shoulder of dentine between the front of the tooth and the pulp chamber. Hence enough tooth substance should be cut away to give the operator a chance to reach that canal from a distal direction. Too much emphasis cannot be laid on the question of proper extension of cavity for access. In lower second molars the canals

are closer together and more nearly parallel. It must be remembered that there are two canals in mesial root.

The canal portion of the lower incisor is much flattened from labial to lingual; the longest diameter is at the gingeval line. It grows thinner as it nears the cutting edge, but somewhat broader from mesial to distal. It contracts gradually toward the root and blends with the canal in a slit-like opening extending the greater portion of the root. In many instances, however, on account of the thinness of the root, the canal may be divided for a portion, or possibly for all the way. This division may begin at the gingeval line or below it, usually uniting into a single apical foramen. As age advances these canals often become exceedingly minute. Access may be gained through a mesial or distal cavity, which must be extended pretty well toward the cutting edge, or through the lingual side, in line of the long axis of the canal. Here again must the shoulder formed between the canal opening and the cervical border be cut away so an instrument may pass with little or no bending. On account of the thinness of the root from mesial to distal, great care must be exercised that a drill is not forced through the lateral wall. Cavities must be extended toward the cutting edge enough to permit thorough excavation of the pulp chamber.

Lower cuspids, when treated, are entered in a similar manner, *i. e.*, either through a proximal cavity or through the center of the lingual side. The same care must be given to cutting away the shoulder or borders to allow of good, free access in line of long axis of canal. In the lower cuspid it is well to bear in mind that there may be two distinct canals with separate apical foramina. Should the entrance be from a proximal cavity that did not open much on the labial side, it should be extended far enough to lingual to give most direct access to canal.

Lower bicuspids are often difficult of access because of their position in the jaw, and because of the fact that their buccal cusps are carried so far over to lingual, thus bringing the thickest portion of enamel over the central or long axis of the canal. In extending either a mesial or distal cavity toward the center of the crown, it can be done by cutting up from beneath; that is, by undermining the dentine and then cleaving off the enamel. When a lower bicuspid must be entered, either through the crown or through a good filling, extreme caution will be necessary, lest the drill is forced through the lingual wall at neck of the tooth, as the crown is placed on the root at a marked angle, and the neck of the tooth is much constricted.

Access is not infrequently obstructed by pulp stones. In the single rooted teeth these deposits are usually round and easily dislodged. In molar teeth they may be small and round or they may be large and irregular, nearly filling the pulp chamber. In the latter cases, with a good general knowledge of the size and shape of the pulp chambers, there can be no harm in cutting away freely with large round burr until the edges of this deposit or growth can be outlined. Then it can be pried out or chipped away.

Sometimes a case is presented in which there is exposure of nerve through a small, deep cavity, say on the distal or buccal side of a tooth, close to cervical margin, a cavity that can be excavated and filled, but through which it would be impracticable to remove a pulp or treat a tooth. In such cases excavate and apply treatment for devitalization of pulp and fill permanently with expectation of opening through a more convenient point of access after death of pulp; the pulp chamber may be extended to original treatment, which may be now removed, and the chamber extended to a good, sound portion of filling without cutting away the coronal portion over original cavity.

The position of the patient in the chair is of great importance in treatments. For upper treatments the patient should sit well back in chair, with head thrown back. The chair may now be tilted back so the operator may have a good view of work.

In lower tooth treatments the patient should sit well back in chair, with head nearly erect, so that no shadow is cast by the lower lip or the lower front teeth.

As an aid in finding canals and gaining access, dilute sulphuric acid, followed by bicarbonate of soda, is often used. The action is not only upon the partially decalcified walls of canals, but when treated with the bicarbonate of soda the two together act mechanically, the effervescence so caused bringing out many small particles of debris not otherwise reached by broaches. Again, when neutralization and effervescence have ceased and the cavity has been dried with hot blast, the walls of cavity and canals are coated with a thin layer of soda, and a canal will sometimes show a dark spot which had not been noticeable before.

In the writer's opinion it would not be advisable to use sulphuric acid in recently devitalized teeth; three per cent pyrozone, or peroxide of hydrogen, or peroxide of sodium may be used in same way.

METHODS OF CROWN AND BRIDGE WORK.

BY GEORGE E. QUINN, D. D. S.

Read before the Northern Indiana Dental Society at South Bend, Ind. September 24-25, 1902.

No apology is necessary, or even appropriate, for the presentation and discussion of a paper on crown and bridge work at this time. It is a subject which has and probably does receive more attention by the dental societies the country over than any other, and judging from the faulty work it would seem to be slighted. Yet it is being perfected by experience and discussion of methods, and, like all other things, it must have its formative period.

It is practiced by nearly all the profession with varying degrees of success, and there is probably no other branch of our work in which there are more failures or unsatisfactory results than in this same branch of crown and bridge work.

The object of all who try to replace lost crowns or lost teeth with a substitute that will perform the work of the lost ones is the same, but our methods and our operations in detail differ very much. It is therefore evident that observation and discussion of methods are very profitable.

The question of when to crown and when not to crown; when to bridge and when not to bridge shall not be treated by this paper any further than to say that there are probably as many failures because of poor judgment in this regard as in poor construction or workmanship. I consider it a good rule to fill whenever it can be done to give the patient a reasonable time of service, and with this consideration I always say never crown a tooth as long as it can be filled and never bridge unless there is a real need for utility or a great desire for appearance.

Having, however, decided to replace the lost parts with a crown or bridge, it should be done with an aim to secure the greatest possible permanency and the best possible appearance. These points, I fear, are too often slighted, as I have often seen it done by unscrupulous dentists, whose sole aim in the profession is to get fees, and in place of doing the best for the best fees they do the most for the most fees, with little or no thought of the future service of the work.

As the object of this paper is to advance some definite ideas for the good of both dentist and patient, it will be proper to ask wherein do our present methods need improving.

In my consideration, one of the most faulty points in the construction of a crown is the band to encircle the root. It is a foreign body inserted between the root and surrounding tissue. It severs the peridental membrane at its union with the mu-

cous membrane of the gums at their margins. It is a constant irritant and usually to the extent of inflammation and suppuration. The inflammation affects the whole peridental membrane and loosens the root in its socket. It causes absorption of the gum and the exposition of the entire labial portion of the band. It presents an appearance very unsightly as well as a decided physical injury. I have removed many such crowns to replace them with others to overcome that fault.

But, you ask, where do you get sufficient strength of root to support the crown while it performs the work of mastication. I will tell you when I describe my method of crowning.

The next fault that troubles dentists much and probably their patients more is the tendency of porcelain facings to check or crack under the heat of soldering and necessitate their replacement before setting or at some time after the work is set. They are liable to break off any time after the work is in use from this checking or from the strain of mastication. It is my experience and probably that of all my auditors that facings will check sometimes in spite of the greatest care in soldering. There are several reasons for this with which you are doubtless familiar. It is also true that facings will check around the heads of the pins and out to the backing so it is impossible to detect it while the work is intact. It is nevertheless true, and were it not so I would be dollars and days ahead to-day. I have taken off bridges of my own and bridges that were not my own to replace broken facings, and I know other dentists do the same thing. This trouble is quite as universal as crown and bridge work.

It is this that has given rise to several attempts to invent a detachable tooth or rather a replaceable tooth, of which "Mason's detachable tooth" is the only struggling representative at present. And the S. S. W. Company catalogues two different sets of instruments, quite complicated, for the purpose of replacing facings without removing the work from the mouth, which goes to show the demand for some method to overcome the trouble of broken facing. One of these methods is essentially the same as what I used in '93 and '94.

Another thing that gives our work a very bad appearance and condemns it very often is the change of shade or tint of the facing, which frequently results from overheating or from the usual heat of soldering. More than that, a facing usually presents a different tint from setting on a metal back of gold or platinum. This change of shade, from whatever source it may come, is a deplorable result, at once disagreeable to patient, disgusting to dentist and disastrous to business.

Another result desirable in the construction of a crown or bridge is to get a bicuspid or molar that will, when seen in the

mouth, present the appearance of a natural tooth. It is disgusting to see a row of gold crowns on the anterior teeth, but it is nearly as bad to look into the mouth and see walls of solid gold from the cuspid to the wisdom teeth. This has been attempted in various ways by using plate teeth, which are about half size, on the occluding surface, and also by using vulcanite teeth in different ways, but these seem so unsatisfactory that the prevailing crown or bridge back of the cuspid tooth, with the exception of all porcelain work, is made entirely of gold. A properly made porcelain crown is a beautiful piece of work and probably strong enough for practical purposes, but there seems to be some question about the strength of a porcelain bridge. At present, however, only a few dentists are good porcelain workers, and probably nine-tenths of the dentists are using the combination of gold and porcelain. It is these that may profit from this discussion.

The best crown is one made somewhat after the style of the Richmond, of which my crown is a modified form. This crown is the result of improvements, to me original, that have been made from time to time in actual practice. After treating the root and filling it, I dress it down with corundum wheels to nearly a plain surface extending from a point about 1-16 to 1-32 of an inch above the gum on the lingual side to a point about that distance below it on the labial or buccal side. By this I have a root face, the labial, 1 2-3 of which is slightly below the gum margin. I then remove the enamel usually remaining on the lingual side of root. I ream out the canal with round burs, using a small one first and

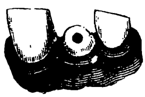


FIG I

following with larger ones until I get the post hole the desired size and depth, always preserving the round form. I do this because a round hole will give me space for the strongest post possible relative to its greatest diameter, and it leaves no weak side to the root as a rectangular or oval shaped hole will do.

I select a post of round iridis-platinum wire about gauge 16. I point this somewhat and cut a slight thread on it for the distance it is to be inserted into the root to give it an uneven surface, facilitating the adhesion of the cement. Before cutting this for my post I cut from pure platinum plate about gauge 34 or 35 a disk large enough to cover the end of the root. I punch a hole in this, put it on the wire and place the threaded end in the root (see Figs. II. and III.) and force the platinum disk against the end of the root and hold it in its relation to the post with a little wax.

I then remove the post and disk together and stick the threaded end in loose plaster or pumice until the disk lays on top and solder

FIG 2

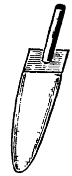


FIG 3

with a little gold, 22k or 24k. I then replace it on the root and with serrated instruments hold the disk against the face of the

FIG 4

root and burnish the disk down to root and over its corners sufficiently to mark the size and shape of root on the disk of platinum. I remove it and with scissors I cut the disk the shape of the face

FIG 5

of the root (See Fig V.), and flow over its upper surface a thin layer of gold to stiffen it some, after which I replace it on the root and reburnish again to be sure of perfect adaptation. I then dress the edge of the disk with a file and cut from the same platinum a strip long enough for a half band. This I bend around a form a little smaller in diameter than the disk and slip it on the lingual

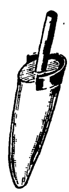


FIG 6

half of the disk and tack it at one point with solder (See Fig. VI.). I then place it on the root and burnish my half band to the root, securing a perfect adaptation. I remove it and, setting post

down in my loose plaster or pumice, I flow sufficient 22k solder on top to make the whole thing rigid. After trimming my half band to the desired shape and cutting the top of the post off, I have my cap and post complete as in Fig. VII.

FIG 7.

This half band, in my opinion, observation and experience, is sufficient to preserve the strength of the root. There is no weak side to the root. The lingual half of the root is firmly bound by the half band and post and will not break from the front half; and, further than that, the force on a tooth set on such a face tends toward the labial or buccal side, and it cannot move in that direction because of the half band. I don't believe roots split unless they are very frail from previous decay or are cut nearly in two by drilling for the post. I have never had any trouble when preparing a root as stated.

I then place my cap in position on the root, take a plaster impression, make my model with cap in position and place on the articulator. I select my facing and grind to fit and also round the corners where desired to burnish my backing over, and with a pair of pliers modeled for the purpose I hold the pins and rivet the end until I have a well defined head on the pin similar to that

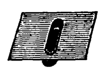


FIG 8

CROSS SECTION

on a vulcanite tooth. I now make my backing, as shown in Fig. VIII., out of pure platinum, about 34 or 35 gauge. This is made with the cap portion just large enough to slip over the headed pins and deep enough to set down to the tooth and with the side

FIG 9

FIG 10

CROSS SECTION

walls parallel, as shown in the cross section. (Fig. X.) I place this on the tooth and burnish it to the surface perfectly, as in Fig. XI., forming a close fitting seat or saddle, into which the facing sets. I then remove it, anneal, replace and reburnish until the adaptation is perfect, then holding in a pair of delicate tweezers I flow gold over its surface and replace and reburnish. When the adaptation is satisfactory I lay on loose plaster and cover

the back with 22k solder to the desired shape. (See Fig. XII.) With a little wax in the cap I stick it onto the facing and place it in position on the model and wax it up on the back.

FIG 11

FIG 12

I remove the model from the articulator and with a warm instrument I warm the facing and remove it, leaving the back insitu and invest my case in plaster and asbestos about 3 to 1; being careful to fill the caps with the investment. As soon as it is set I remove the wax and solder. It can be dropped in water to cool and is ready for finishing, part of which I do with the facings in place.

I now take a small engine burr and roughen the inner walls of the cap to aid retention and put the facings on with vulcanite or cement, sometimes using one and sometimes the other. I consider archite very good for that purpose, as it is very hard and strong. When put on this way there is practically no change in the shade of the facing, the crown can be set with a guarantee that the facing is not checked by soldering, and if the facing should ever get broken off another can be ground to fit and put on in a short time, with little inconvenience and no tampering with the cap or root. This is the way I make my modified Richmond crown for any of the anterior ten teeth, and my experience with all kinds of crowns has proven to me it is the most substantial and the most beautiful crown made.

FIG 13

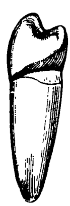


FIG 14

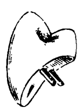


FIG 15

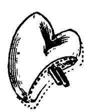


FIG 16

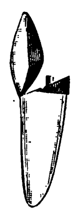


FIG 17

FIG 18

I make my bicuspids similar to the incisors, using the same backing, but using the S. S. white saddleback tooth, which does away with the appearance of gold over the grinding surface and makes a very beautiful appearance in the mouth. (See Figs. 13, 14, 15, 16, 17 and 18.)

In the application of my method to bridges I make my abutments on the anterior teeth, just as I make my crown and usually

use on the molars a full gold cap. I then proceed as for an ordinary bridge, but back the teeth with the same kind of backing, always using the saddleback teeth for posterior teeth, unless I have a case with such a close bite that they cannot be used. After being waxed to position and facings removed, and being invested, it can be soldered immediately, can be cooled in water if desired and finished without delay.

The points of advantage in this method are: The preservation of the strength of the root; the half band; the perfect adaptation of cap to the root and the easy setting of the same; the replaceable tooth; the saddleback, to which the tooth is attached after all soldering is done, which avoids the necessity of heating the porcelain with consequent checking, and also the use of the saddleback bicuspids and molars. Further than that, there is a great saving of time, for this crown can be made and set while the patient is in the chair if desired. Owing to the fact that there is no heating of the porcelain, much of the work can be done in less time than it has taken to describe it. There is no delay of drying out the investment, in heating up the investment or in waiting for a case to cool. I can make a crown of this kind in from one-third to one-half the time required for the Richmond crown, or even less.

Up to the present time I have always made my backing from platinum plate soldered with gold, which is the slowest part of the whole operation. I have had trouble in getting dies made to stamp them out, but at present I am having some made that will do the work satisfactorily, and these backings will be on sale at the dental depots in probably another week. The ready-made backing for this method is my own invention.

I am also negotiating for the manufacture of the facings and the saddleback teeth with headed pins, and with the backings and teeth on hand crown and bridge work will be much more easily and quickly done, with a certainty of better service to our patients and better fees to ourselves.

A NEW PROCEDURE IN TREATING A PULP AFTER PRESSURE ANÆSTHESIA.

BY R. B. TULLER, D. D. S.

How often it happens that a toothache appears for treatment just at that inopportune moment when your hands are full with something else that cannot be set aside for more than a very few moments.

I have found that pressure anæsthetia can be used and pain instantly subdued, and the infiltration may be carried on to complete paralysis of the nerve. Now, in a very favorable case, perhaps the

pulp could be extirpated immediately. In other cases it would consume more time than we can give. We would like to put in a temporary stopping, the pain being relieved, and leave it until another sitting. This I have done in several instances by packing the stopping in hard, taking no pains to avoid pressure on pulp, as we would ordinarily do. In fact, I have opened chamber a little more freely than at first and intentionally pressed gutta percha stopping in hard. My idea was not to allow return of circulation and probable pain if pressure would keep it in the paralyzed condition it was then in. I am not sure that a pulp ever returns to a normal or sensitive condition after thorough pressure infiltration. It does not follow that because soft parts injected with hypodermic needle recover that a tooth pulp will do the same. But I felt surer with pressure kept on it after my cocaine preparation had infiltrated it, and the result was very satisfactory. Out of eight cases so treated only two admitted that there was any disturbance whatever after the pain subsided under first gentle pressure, and those two said it was very slight.

On opening into pulp chambers at later sittings no life was apparent, except in one case, at extremity of root, where a little pain was felt in fishing out with broach for any remainder after bulk of pulp had been removed. One thing is evident, that the result has been in every way more satisfactory than killing a nerve with arsenic. It may be found that gutta percha stopping may be used with equally good or better results without pressing it in as I did.

Another thing is apparent, and that is that the aching tooth subsides almost immediately and increasing pressure to force anæsthetic forward, and the entire operation can be performed with no pain worth mentioning—absolutely none in some cases—and it can be done with dispatch, and your pulp is ready to remove any time within eight or ten days. Putrefaction might make trouble after that.

PROPHYLACTIC ITEMS.

BY R. B. TULLER, CHICAGO.

(THE FIRST OF THESE ITEMS BEGAN IN JULY)

(The first of these items began in July.)

Whew!

What it is?

A breath—a *bad* breath.

You know how rare it is to find a perfectly sweet or tolerable one.

And a fetid breath with aromatic flavoring—fury!

And some of us dentists are not altogether immune.

Met a dapper fellow the other day—dentist.

He was dressed in fine taste.

His white vest and linen were immaculate.

He was clean shaven with evidence of a rose-bloom massage on his cheeks.

His hands looked as though he had just come from the manicure.

But say! his breath!

And I'm sure he was unconscious of it.

Strange how you can't smell your own breath.

Not even when it is a very "dark brown."

What is to be done?—for both yourself and patient?

A dentist should always presume that his breath is not "sweet violets."

It is a good time perhaps to use some of those samples of washes or disinfectants left with you.

This is all along the line of prophylactics because a sweet breath on your part may *prevent* loss of business.

It is a good plan to presume that you need a deodorizer at the beginning of an operation.

And perhaps a few times before you get through.

And this leads up to mouth washes. How about them?

Do they preserve teeth?

Well, you still have your occupation.

And the colleges are grinding out thousands of new dental buds.

The field of mouth washes and antiseptics is a great one for fakers.

Some of them are positively injurious to the teeth.

I mean both—the faker and his wash.

But the gullible public will have them.

I advised you to try some of them, didn't I?—on yourself?

Sure. Try them on yourself before you commend them to your patients.

Your advice is frequently asked by your patients as to this or that well advertised mouth wash.

And you usually give it, gratis, instead of writing a prescription.

Parenthetically—(Can you write a good one?—correct thing for your patient and worth a fee?)

I think most of us are too ready to commend some wash or antiseptic (so called) of which we know little or nothing at all.

Same with tooth powders and pastes.

Are any of these things universally good?

Are all mouths, or all conditions therein, susceptible to the ex-

tolled virtues of the various things on the market?

How about litmus paper? Do you keep it ready at hand and use it?

Do you test these different solutions?

Do you make a frequent practice of testing the saliva of your patients before commending popular remedies? Popular because well advertised.

When using litmus it is well, after testing the saliva, to isolate the teeth from the general flow and after first drying, test the moisture about the necks and in the pockets and recesses between the teeth.

The result will sometimes surprise you. Why?

Because you will find often if not always much more acidity in the latter test.

Then it is evident that the saliva in a general way is not sufficient to tell us the whole truth.

It should be our business to get at the whole truth and nothing but the truth.

Then we can more intelligently treat diseased or abnormal conditions of the mouth.

Don't forget that it is the milk of human kindness in you, very often, to recommend milk of magnesia as heretofore advised to reduce acidity about the teeth.

A weak solution of bicarbonate of soda—common baking soda—is good also to counteract acidity.

That is always at hand in every household.

Acidity that corrodes tooth enamel and dentin should be fought continually by the patient under the intelligent advice of the intelligent dentist.

For which a professional fee should be secured.

Prophylaxis is worth more than gold.

MEDICAL TREATMENT OF DENTAL PAIN.

BY DR. EDWARD H. BOWNE.

The excruciating pain of toothache and dental neuralgia oftentimes does not cease under local treatment—with ordinary remedies, hence I resort sometimes to hypodermic medication.

Take for instance a case of toothache that has resisted all treatment by the ordinary remedies locally applied to the cavity—in such a case I inject into the gums near the seat of pain $\frac{1}{8}$ gr. morphine and 1-200 gr. atrophine in *divided* doses *one hour apart;* as a matter of

fact seldom use the second dose as it is unnecessary—the pain being relieved almost instantly by the first injection. In certain forms ot dental neuralgia I prescribe a 2 gr. quinine bi-sulphate pill and a pill of aconine gr. 1-134—every two hours until four doses have been taken, then omit the powerful medicine entirely for eight hours —generally the second or third dose gives relief, oftentimes lasting for hours and even days before there is a recurrence of pain.

Very often I prescribe in the various forms of dental pain 2 gr. and 5 gr. doses of antikamnia, and phenamid 2 gr. and 5 gr. doses, every two hours until four doses have been taken by the suffering patient. The benefit derived from the intelligent use of these chemicals sometimes borders on the marvelous, much to the delight of patient and practitioner alike.

In the extraction of "worthless" teeth there is nothing *superior* to

Cocaine hydrochlorate	$\frac{1}{2}$	gr.
Morphine sulphate	$\frac{1}{8}$	gr.
Atrophine	1-200	gr.

dissolved in

Aquæ pura	6	oz.

and injected in the gums around the teeth to be extracted.

The irritation of the gums following this dental anæsthetic is very slight, and very often entirely absent.

A QUICK WAY OF MAKING A RUBBER PLATE.

BY C. H. WORBOYS, D. D. S., ALBION, MICH.

To know how to construct a set of teeth in a very short time is a very convenient thing sometimes; the object of this paper is to give you a plan by which it may be accomplished and at the same time do so in such a way that you will be able to proceed with great exactness. This description will be for a full upper denture. A tray is selected that is smooth, and fits the jaw as close as it is easy to use on the case, and then an impression it taken in modeling compound; this impression should be thoroughly chilled, and then carefully slipped from the tray, with a sharp knife. Now trim the impression to just the outline that the plate is to have, and do any relieving along the hard ridge that may be considered necessary; at the edge and across the back make it quite thin. Now try it in the mouth, and if it is all right, remove and wax up for a bite.

At this point I wish to call your attention to two anatomical points of the human skull, that we seen to forget exist when we

are constructing an artificial denture for the upper jaw; namely, the canine ridge and the canine fossa. These should be reproduced, and one is just as important as the other in order to restore the face to its former appearance. Another point is the correct distance between the jaws. This is difficult to ascertain where there is no record of measurements. It is my practice to take the distance between the nose and the point of the chin with a pair of dividers, and from the same point under the nose to the cutting edge of the central upper incisor, with the color, width and length of the tooth, all of which are registered with the patient's name before the extracting is done. These measurements are very valuable when the time comes for constructing the plate.

Having secured the bite, the incisors are now waxed onto the impression and arranged as desired; the bicuspids and molars are set and articulated to the lower teeth on one side first, and should be firmly waxed, then those of the other side are set up and articulated, all of this being tried in the mouth from time to time; wax smooth, and finally with a sharp scraper cut the modeling compound as thin as you wish the plate, and it is now ready for the flask, which I open by using warm water to heat the compound, and continue as usual with a rubber plate.

Sometimes the teeth have to be set so close to the gum that the above procedure cannot be followed, and in such cases I take an impression of the lower teeth, run up a model and then fill the upper impression and set the whole on the articulater to arrange the teeth and that only requires a few minutes longer.

A PECULIAR CASE.

DIXON, ILL., Oct. 15, 1902.

J. B. Dicus, D. D. S.:

DEAR SIR.—An old gentleman of about sixty (60) years of age came to me in August suffering intense pain on right side of face. Antrum symptoms not very strong—greatest pain located where the wisdom tooth should have been. In his case it had never erupted.

He had been troubled for seven years—the pain coming and going—gradually growing more frequent and severe—and during the past year he was never free from pain. Physicians have treated him in the meantime for neuralgia. At different times he has had all the teeth removed from that side of the jaw, thinking he might gain relief.

I treated patient at my office for some time with very poor results. Held consultation with his attending physician, Dr. Hunt, of Dixon, and decided upon an operation.

At this time patient was suffering such intense pain that it was impossible for him to take any nourishment except liquids. He was confined in bed for three days in this condition, when he went to the hospital and was operated upon Sept. 1. I made an incision from cuspid back as far as wisdom tooth, finding wisdom tooth lying flat wise of jaw surrounded by dead bone. Removed all dead bone and worked toward the antrum, making an opening into the antrum found it very badly diseased. I made a thorough drainage possible by inserting a silver tube. After this I cut down to the infraorbital foramen which passes the superior maxillary division of the fifth, dissecting a piece from the nerve.

The question naturally would arise why I cut branch of the fifth nerve after finding the antrum diseased. For the simple reason that I wanted to afford my patient instant relief, knowing he could not undergo another operation.

Patient felt some pain for a few days after operation, but improved with surprising rapidity.

He was dismissed from the hospital in ten days, after which I treated him at my office for another ten days, whereupon I dismissed him in fine condition.

Hoping this will be of sufficient information to give the case notice.

I am very sincerely,

Z. W. Moss, D. D. S.

PRESIDENT'S ADDRESS.

BY J. J. GREEN, D. D. S.

(Read before the Central Michigan Dental Society Oct. 1-2, 1903.)

A number of dentists in this locality, wishing to keep abreast of the times, and realizing this an age of rapid progress, decided to organize a local Association that will help us to keep pace with our profession, and we are assembled to participate in the first meeting. If anyone of you ever attempted to organize an Association or helped to arrange a program, we have your sympathy. Our constitution and by-laws are open for amendment, and I trust all who have received a copy of them have made them a study and are ready to offer suggestions for their improvement. Not knowing how enthusiastic the dentists in this locality would be in their sup-

port of our meeting, we have not a lengthy program.

If the organizers of this Association had exhibited better judgment in their selection of a presiding officer, they would undoubtedly have had better results. I, however, wish to thank them for the honor conferred upon me.

To illustrate the recognized advancement in our profession, I call attention to the recognition given to us by the late Congress placing us almost on a par with the practitioners of medicine in the army and navy. I understand that this was brought about by associations of this nature. While the law at present does not provide as liberally as we desire, its importance must be recognized and ultimately the dentists will get their just dues, both as to position and honor.

I wish to present at this time a few thoughts for your consideration. Do we desire any dental legislation in our state? If so, what? I hear this subject discussed in nearly every meeting that I attend. If we do I believe it is because our state and local societies do not pay proper attention to it at their meetings. Dr. Oakman at the last Michigan State meeting at Grand Rapids, advocated a law that would require the appointment of dentists in every city and village to examine school children's teeth from time to time, thus giving us an opportunity to impress upon their minds the necessity of the proper care of the teeth. I think this suggestion a good one, but believe that the matter is largely in our control at present. If we would only take the time to impress it on the parents' minds while they are in our hands for treatment, explaining the necessity for such care, we could gain the same end without resorting to law. If a law is necessary, I would prefer one that would compel the different localities to pay for the care of the indigent the same as they are taken care of now when they are sick and under the care of a doctor of medicine. I trust my calling attention to it at this time may spur some one on to take this matter up. I believe this is one of the best features of our meetings, the inspiration that we get at such times.

A person need not hesitate in saying that the average dentist of today is much better educated than in years past, and it is manifest to every observant person that dental education is having its influence. The profession is fast developing from its comparison to mere trades to the plane of other professions, but who are responsible for this? Are they the rank and file, or are they the ones who have gone through hardships to attain their higher dental education and given us the means at hand for our advanced standing? All

praise to them, but while they have brought our professional education to its present standard, there are yet great chances for future development. Are we taking advantage of their teachings to the best of our ability? Attending society meetings inspiring us to this end?

The Southwestern Michigan Dental Society alone is responsible for the close of the Niles "mill" that was furnishing dental diplomas for a money consideration only. And it was through other Associations of this kind that the Chicago "mills" were obliged to cease their nefarious work along this line.

I call attention at this time to the number of pupils who are attending dental schools and ask each of you if you have done your duty towards them as well as the profession? There are a large number of dental schools that seem to strive to matriculate as many pupils as possible regardless of their education, preliminary or specific. Their next endeavor is to get them out upon the world as rapidly as possible for the money there is in it only. This is wrong, but the schools are not entirely to blame for it. The demand is too much for an education that has the greatest commercial value at the least time and expense, that which can most readily be turned into money, therefore, the different institutions of learning of all character are seldom in advance of the public demand for education.

We have some dental colleges that are in advance. Have we, as dentists, advised young men to attend those colleges where qualifications alone permit them to obtain a diploma or have we advised them to go to a school that will grant them one on almost any conditions? I do not believe that the latter schools would have such large enrollments if we were more careful with our advice. Our experience makes us pre-eminently the ones best able to judge the qualifications best suited in the pupil that is considering the study of dentistry.

The time was when young men and women had to work out their own salvation, and some of the brightest minds among the profession today are numbered among them. There is no way of telling what those men and women might be today if in their early career they might have had the advantage of a college education. Should we not advise that an applicant have, at least, the following qualifications: A diploma from a good high school, a reputable literary college or satisfactory evidence that he is possessed of its equivalent, for a dentist must be well qualified, at the present time, to command and hold a practice against all comers. The brain best prepared for the struggle is the one that will be in it at the finish. If we advise students only to attend the best colleges, I believe that

would compel them all to advance to the same standard or close the doors. It seems to me it is just as necessary for a practitioner of dentistry to keep up his knowledge of essential things pertaining to his profession from time to time as it is for him to store up knowledge in that line before he is allowed to practice. In what better way can he put in a few days every year than attending Dental Associations?

I believe that it would take many times more hours of study, even if we would commit ourselves to it, which we are very apt not to do, for instead of that we would be in the mad rush for money, sacrificing our impulses for a higher dental education. Such practitioners living within themselves and their own views will soon fall behind.

I remember after I graduated that it took me about three years to find out I had not learned all there was to dentistry. I thought that by reading dental journals I was keeping abreast of the times. After attending my first Association meeting I concluded I had just begun the study of dentistry. I have found that many of the discussions fall short of my expectations, but I also found I had gained new ideas and later on developed them. No doubt this is the experience of others.

I hope the short program that we have in store will inspire those of you who have not attended a meeting before, in the same way. In conclusion I want to thank all of the officers and the committees. I wish to say to those who have not helped to get up a dental program or assist in a meeting, if you serve but once you will be more willing to sympathize and lend a helping hand to the society. The officers can accomplish much, but they cannot do it all. If you have not a paper or clinic or your time is not too fully occupied as an officer, make yourself a committee of one to get new members for the Association. The Association will rise in influence according to the individuality of its members, if we but make the most of its opportunities we are sure to rise, making our Association stronger, just in proportion as we develop strength individually.

I thank you for your kind attention.

Editorial...

PUBLICATION COMMITTEE OF THE ILLINOIS STATE DENTAL SOCIETY WITH A CHIP ON ITS SHOULDER.

Since the publication in the AMERICAN DENTAL JOURNAL of an abstract of the paper of "Professional Ethics vs. Patients," certain men, who always have a dislike for anything in which they are not interested, have had considerable to say and do because the AMERICAN DENTAL JOURNAL sees fit to publish literature before it gets so stale it is ancient history.

It has been the custom for certain dental journals to work through their "political Fridays" and secure the proceedings of all the dental societies in their domain and then pigeonhole them; they might appear in one year, and perhaps never. The members of dental societies who are not back numbers are against this sort of skulduggery and wish to see the evil corrected, and we have received many words of commendation from leading men of the profession for the manner in which we have supplied live topics at a nominal fee.

The AMERICAN DENTAL JOURNAL believes its purpose is to give news of interest to dentists, and if a paper is presented before any society and the JOURNAL or its representative secures notes or extracts upon any paper so given it is not violating any laws of ethics or even the laws of an intelligent community by printing such extracts.

As to the paper in question the AMERICAN DENTAL JOURNAL did publish quite an extensive abstract, because we thought it and the thoughts contained therein worthy of this. We did refrain from printing the discussion on the paper because we felt that insults were given to the medical profession which no man worthy of the title of dentist would have uttered,, and even J. N. Crouse, who uttered them, was so ashamed of what he said that he refused to embody them in his printed discussion. The remarks to which I allude meet with a just rebuke at the hands of the essayist. Now, because Dr. Crouse knew this case of one unscrupulous physician it was not necessary nor was it in keeping with the plane upon which the best

dentists should travel to draw the deduction that all the medical profession to be of such a stripe of unworthy men.

The editor on referring to the constitution and by-laws of the Illinois State Dental Society under Section 6 of Article I of the by-laws finds the following:

DUTIES OF PUBLICATION COMMITTEE.

Sec. 6. The President shall appoint annually, after the election of officers, two members of the Society who shall act in conjunction with the Secretary as the Publication Committee.

They shall be authorized to employ a competemt reporter to furnish an accurate report of the proceedings of each meeting.

They shall superintend the publication and distributions of such portions of the transactions as the Council may direct or the committee judge to be of sufficient value, and shall have full authority and power to cut down, amend or leave out such matter as they deem best for the proper preparation of the transactions for publication.

They shall specify in their annual report the character and cost of the publications of the Society during the year and the number of copies still on hand. Any report or other paper entitled to publication in the volume of Transactions for the year, in which it shall be presented to the Society, must be placed in the hands of the Publication Committee on or before the last day of the annual meeting, and must be also so prepared that the proof sheets furnished the authors shall be returned without material alteration or addition.

Every paper received by this Society and all plates and other means of illustration shall be considered the exclusive property of the Society and shall be published for its benefit.

DISCLAIMER.

This committee is hereby instructed to print, at the beginning of each volume of the Transactions, the following disclaimed, viz.: "The Illinois State Dental Society, although formally accepting and publishing the reports of the various committee and the essays read before it, holds itself wholly irresponsible for the opinions, theories or criticisms therein contained, except when otherwise decided by special resolution."

In the foregoing we find nothing whereby the Publication Committee is to go out of its way to usurp the powers of the State Dental Society and transact business which belongs to the Society, rather than a committee whose duties are defined in the foregoing section; but, then, what can you expect from a committee who are indebted to a journal politically for its personel and the chairman of the committee being secretary of the Society and under obliga-

tions to his political boss for his selection, and was following out the instructions given the committee by the manager of the *Digest* before the meeting of this committee. Under these circumstances would you expect such a member to read a section defining his duties when he has but two purposes to serve. First, the coveting of honors by holding a position, and, second, the paying of a political debt for the elevation to such honors.

In regard to the second member of the committee, we desire one question answered before we can explain his ardent zeal in giving voice to the resolutions of his committee. Why is it that after the appearance of the paper in question that this member of the committee stated he saw no very great breach in it and that it was common occurrence, but after having discussed with certain gentlemen the fact that the AMERICAN DENTAL JOURNAL had seen fit to publish the papers of Drs. Rogers and Peck (over which there has been so much discussion) on Physical Diagnosis, he could see that it was incumbent upon this committee to pass resolutions, which were passed, censuring the publishers and editor of the AMERICAN DENTAL JOURNAL for things done which before this incident, in their own language, was not out of the ordinary and which had been done hundreds of times before by other journals, not excepting the *Digest*. It has been stated that something must be done, as the AMERICAN DENTAL JOURNAL will not last long, but to this party let me say the AMERICAN DENTAL JOURNAL and its editor are not going to "die just" yet.

We are reliably informed that the third member of this committee was not here when the passing of these resolutions was hatched, but upon his return this "great breach of ethics" was brought to his notice, and he was told how necessary it was that a set of resolutions be passed condemning the AMERICAN DENTAL JOURNAL so that this matter of giving live news would be stamped out at once. This member of the committee was not even present at the passing of the resolution, but, being a member, he was easily persuaded to do the bidding of men with an ax to grind and signed the resolution.

We would suggest that the chairman of the committee take the trouble to call a meeting of his committee and present each with a copy of the constitution and by-laws of their Society and read and ponder carefully over the duties of their committee and act in accordance with their duties as prescribed. If the State Society has any business to transact, let it be transacted by the Society or by a committee duly appointed to transact such business.

We are not to suggest to the State Society what they shall or shall not do, but it certainly should look to electing officers the next time who are not elected through a political plot and men who strive to keep men out of the appointive positions because they do not be-

long to their clique. An instance could be related of a meeting of the Executive Committee at Springfield in May when a certain name was suggested for a position, and a wire puller caught this at once and suggested that a man should be appointed who had been a member of the Society longer than six years, and in the next breath was caught in suggesting a man for another more important position who had been a member but one year. Let this kind of politics and politicians be weeded out of control of the Societies and we will have better societies.

Let the office seek the man and not a lot of boosters seek the office.

PUBLISHERS' COLUMN

RESOLUTIONS OF CENSURE ADOPTED BY PUBLICATION COMMITTE OF ILLINOIS STATE DENTAL SOCIETY.

Whereas, Frink & Young, the publishers of THE AMERICAN DENTAL JOURNAL, and J. B. Dicus, its editor, have taken the liberty of publishing under the head of an abstract literally almost the full text of a paper entitled "Profesional Ethics vs. Patents," read before this Society at its last meeting, without consent of the Society, the author, or the *Dental Digest*, that journal being the authorized publisher of the proceedings; and

Whereas, Such usurpation of the prerogatives and privileges of the Society must be regarded as a flagrant violation of professional ethics and editorial courtesy; therefore, be it

Resolved, That the publication Committee of the Illinois State Dental Society hereby censures the said journal and its editor for an action which cannot be countenanced as professional, ethical or honorable; and be it further

Resolved, As a matter of precedent, that this action be reported in the proceedings of the Society and published in the *Dental Digest* simultaneously with the appearance of the article referred to.

(Signed) H. J. GOSLEE,
D. M. CATTEL,
G. W. DITTMARR

Publication Committee of the Illinois State Dental Society.

We peruse the above—and yet again—with something indefinite, dreamy, visionary, trying to assert itself in our brain. In vain we try to grasp it, to make of it something real, something tangible. Fleeting and meaningless words and broken sentences flit by. What was that? "Great Personal Sacrifice," "Disgraceful Triumvirate," "Protection to the Profession," "Send Twenty Dollars," and then softly floats a vision, and slowly it settles, assumes shape,

and we see now quite clearly: A man, short, rather broad, a little bent, eyes half closed and gazing heavenward as if seeking inspiration from above, hands on hips—and now the lips move, he speaks: "A few minutes of your time," he is saying. It is the best day of a dental meeting, and then—talk, talk, talk. Gently floats a halo o'er his head, and surely this is a great and good man, for does not all his talk tend to prove this?

With a start we come back to reality and now we know who is the real author of the above untruthful set of resolutions (for it is untruthful), and if the gentlemen whose names appear as signers of the above knew the real facts they would not have attached their signatures to an untruth, but induced by the master mind (a mule's mind is strong though never broad), they have fallen into this error.

Great Personal Sacrifice Crouse having been unable to prove himself innocent of the charge of having practically purloined a copyrighted article from the *Items of Interest* and of having published it without giving credit to the author, was in no position to make this puny thrust at the AMERICAN DENTAL JOURNAL, so he hides behind the members of the P. C. of the I. S. D. S. and induces these otherwise worthy gentlemen to sign their names to an untruth, for the AMERICAN DENTAL JOURNAL is not guilty as charged, and in all fairness should have had an opportunity to make a defense before being pronounced guilty and hung on such a gallows as the *Digest.*

Great Personal Sacrifice Crouse, being firmly convinced that he is, by Divine right, editor, publisher and purveyor of the official organ of the universe, looks with ill favor on all competition as being "usurpation of his prerogative."

Usurpation of Prerogative—a dainty morsel to be rolled under the tongues of your committee. Have you not usurped the prerogative of the Illinois State Society and have *you* not gone far out of your way to censure the AMERICAN DENTAL JOURNAL? We have carefully scanned that part of the Rules and By-Laws of the I. S. D. S. devoted to the duties of the Publication Committee and fail to find where this Committee is empowered to use the name of the Illinois State Dental Society, to become self-appointed judges, jury and prosecuting attorneys, to accuse, try, convict, sentence and punish the AMERICAN DENTAL JOURNAL.

And, again, these self-appointed censors of the Dental Press make use of the expression, "editorial courtesy."

In what way are you interested in Editorial Courtesy, except as you receive your inspiration from the Nestor of Editorial *Dis*courtesy—Dr. Great Personal Sacrifice Crouse, aided and abetted, perhaps, by venomous spite emanating from one member of your Committee and directed toward the editor of the AMERICAN DENTAL JOURNAL?

JOURNALISTIC COURTESY AND THE FACTS IN THE CASE

In the October number of the *Dental Digest* the Publication Committee of the Illinois State Dental Society issues some reflections on the publishers of this journal and also on the editor, regarding the abstract of Dr. C. E. Bentley's paper, "Professional Ethics versus Patents," read before the Illinois State Dental Society, in May, at Springfield, Ill.

The abstract of Dr. Bentley's paper in no sense vitiated the effect of the whole paper which has been tardily published by the *Digest.* In a footnote at the end of the article it was expressly stated that the whole paper would be found in the proceedings of the society, which it was reasonable to suppose would have appeared as early as September or October, at the latest.

The protest of the committee in reality appears to be a wail from the editor of the *Digest.* We will, therefore, pay our compliments to him.

To enumerate all cases of violation of journalistic courtesy by him would require the entire space of the JOURNAL, but as they are all more or less of kin we will mention at this time but one.

When the National Dental Association met at Niagara Falls in 1899, the editor of the *Digest* read a paper which properly belonged to the *Dental Cosmos,* as it was then publishing the transactions of the National Dental Association, but in the next issue the editor's paper (Crouse's) promptly appeared in the *Digest.* Numerous instances of the habit of publishing matter which did not belong to it have occurred in the past and as we did not publish the paper in full we have no apology to make to the *Digest.*

An abstract of a paper is always permissible and we submit that the abstract published on page 14, Vol. 1, No. 1, of this JOURNAL is not the same as the paper published in the *Digest* for October, page 817 *et seq.*

The committee may resolute all it pleases, but we think the resolutions of the committee would not have appeared if the editor of the *Digest* had not inspired them, and moreover, if the editor had not been such a flagrant violator of all Journalistic Courtesy in the past we would feel sorry for him, but we do not, and there's an end on't.

THE AMERICAN DENTAL JOURNAL AS AN ADVERTISING MEDIUM.

One of our advertisers reported to us that out of sixteen replies received from his firm's advertisement which appeared in both the AMERICAN DENTAL JOURNAL and the *Digest,* fifteen had mentioned the AMERICAN DENTAL JOURNAL and one the *Digest.* Though not

the usual sixteen to one, it is near it, and fairly represents the relative value of the two journals as advertising mediums.

.. ITEMS ..

A GLOWING TRIBUTE TO THE ILLINOIS STATE BOARD OF DENTAL EXAMINERS

On Saturday evening, Oct. 18, at De Jongh's, the dental profession of Chicago, under the guidance of Dr. Charles E. Bentley, as chairman of arrangements, tendered to the Illinois State Board of Dental Examiners a complimentary dinner. There were assembled around the festive board the following practitioners to spend a few hours in feasting and listening to the words of praise for the works of the Board: Col. Koch, R. N. Lawrence, Judge Knickerbocker, D. M. Gallie, C. C. Chittenden, C. F. Rowley, I. F. Pritchard, Geo. Dannon, J. G. Reed, J. N. Crouse, Jas. Weinik, Geo. Appel, A. B. Allen, C. E. Bentley, J. O. Brown, W. G. Benkhart, T. W. Brophy, Robt. Brensten, Arthur Black, T. A. Broadbent, C. S. Bigelow, D. C. Bacon, C. Bryant, R. C. Brophy, J. P. Buckley, J. O. Black, J. A. Bullard, Condit; D. M. Cattell, H. J. Comb, G. Christman, R. E. Cockrell, Geo. W. Cook, J. Cruise, J. W. Dunn, J. Austin Dunn, L. L. Davis, Geo. J. Denin, J. B. Dicus, Dr. Frink, Hugo Franz, V. H. Fuqua, H. J. Goslee, W. Girling, T. L. Gilmer, A. Good, A. Hare, J. E. Hancock, F. W. Holmes, A. C. Hewitt, G. E. Hawkin, A. W. Harlan, J. E. Hinkins, C. N. Johnson, J. E. Keefe, P. J. Kester, S. J. Knowles, C. Klein, L. S. Lourie, C. W. Leake, L. Massman, A. E. Matterson, T. H. McClure, Dr. J. N. McDowell, E. MaWhinney, L. W. Nevius, J. Nyman, F. B. Noyes, E. Noyes, A. T. Nichols, G. B. Perry, A. H. Peck, J. B. Palmer, E. J. Perry, W. T. Reeves, F. M. Richardson, F. E. Roach, J. W. Shedd, H. H. Schuman, Jas. Slomaker, F. H. Skinner, H. R. Sackett, E. E. Smith, W. A. Stevens, G. W. Schaatz, M. W. Trude, R. B. Tuller, L. Tenney, G. A. Thomas, C. N. Thompson, G. N. West, J. H. Wooley, P. H. Welch, B. Wikoff, J. W. Wassall, F. O. Yorker, F. H. Zinn, S. M. White, Benton Harbor, Mich.; C. M. Wesner. After all had partaken of the sumptuous repast which had been prepared, the following assemblage was called to order by the chairman. Dr. Bentley stated it was the opinion of the practitioners assembled that a little taffy should be given to the members of the State Board of Dental Examiners while they lived and less epitaph(y) after they had passed to the silent beyond.

and with this idea in view this dinner was arranged to do homage to these men who have done so much for the dental profession in this great state of Illinois. Dr. R. N. Lawrence, of Lincoln, Ill., was then introduced as toastmaster of the evening. He introduced the first speaker of the evening, Dr. Chas. C. Chittenden, of Madison, Wis., a member of the Wisconsin State Board of Dental Examiners, who spoke upon "The evolution of the dental law of Wisconsin and its bearing upon the National law." Dr. Chittenden told of the work accomplished by the Board of Wisconsin, the troubles they had to overcome in asserting their authority as a Board, culminating finally in the decision of the Supreme Court, handed down Jan. 1, 1902, in which it was decided the Board was clothed with police power of their own and not under the control of any court or power, so long as they acted judiciously; this the court believed they had done. Dr. Chittenden has been one of the faithful workers of Wisconsin and has been one of the leaders, who has done so much to make the dental laws of Wisconsin the success they now are and to give dentistry the standing it now has in the state.

Dr. J. N. Crouse spoke upon "The necessity of the unification of a dental standard." Dr. Crouse suggested the enactment of a new dental law to meet the needs and requirements as well as the necessary funds to carry on the work of the Board. One of the essential features of this law would be a clause compelling every graduate of dental schools in Illinois to have previously passed the examination of the State Board of Dental Examiners, the same as is required in Massachusetts, New York and New Jersey. Another important clause would be one to provide in some way for funds to carry on the work of the State Board, either by making an annual registration fee or an assessment in some form.

Judge John Knickerbocker, the attorney of the Board, then spoke upon "The State Board and its business." He had nothing but words of praise for the members of the Board, stating they had a clear vision as to their duty and were working conscientiously at their labors as they saw them.

Col. C. R. E. Koch gave reminiscences of members of the State Board in years past. Col. Koch told some highly interesting and amusing stories in his own style.

Dr. Weirick, of Minneapolis, Minn., said that whenever a dentist was called upon to do anything at a meeting, he always said he would give a table clinic, because that was the easiest. His subject was therefore "Table Clinic." Dr. Weirick said among

other things that there were too many dental colleges in Chicago, and gave his experience in prosecuting illegal practitioners in his State.

Dr. T. W. Pritchett, president of the State Board, the announcement of whose name was enthusiastically received, made appropriate remarks on the subject of the "Work of the State Board."

Dr. T. W. Brophy spoke on "Relation of Colleges and State Boards." Corrected the previous speakers as to the names and members of the first State Board of Illinois, and gave as correct the names of Drs. Cushing, Black, Harlan, Kitchen and Jerrel.

Dr. G. V. I. Black, introduced as president of the first dental board, made a few brief remarks and was followed by Drs. A. H. Peck, D. M. Gallie, J. G. Read, E. J. Perry, C. R. Rowley and Geo. Damron.

Dr. Cleophas, of Beloit, Wis., was in the city last month, spending several days at the Horse Show. He is a great lover of horses and informs us that it was a great treat.

Dr. Gustavus North, of Cedar Rapids, Iowa, an old-time college professor in Chicago, made us a call this month. He has been making a tour of the Eastern cities and is returning to his duties with very much renewed strength and vigor for his work.

Dr. Robert Blackburn, one of the oldest practicing dentists in Chicago, suffered the loss of his wife in October. We tender our sympathies.

We are surely surprised at the immense number of students attending dental colleges in Chicago at the present time. This speaks well for the profession, which attracts so many young men as a choice for their life work.

Members of the dental profession sympathize with Dr. Chas. Hurlbut, of Evanston, in his bereavement in the loss of his wife. Dr. and Mrs. Hurlbut were married in June and shortly after their return from their wedding trip Mrs. Hurlbut was stricken with appendicitis, from which she died on Oct. 12.

The northern Illinois Dental Society elected the following set of officers for the ensuing year at their meeting at Rockford, Oct. 15 and 16: President, F. T. Bell, Aurora; vice president, W. T. Reeves, Chicago; secretary, A. M. Harrison, Rockford; treasurer, M. R. Harned, Rockford; executive committee, A. W. McCandless, Chicago; C. L. Snyder, Freeport; E. H. Allen, Freeport.

OFFICERS OF WISCONSIN STATE DENTAL SOCIETY FOR 1903

ORIGINAL CONTRIBUTIONS

ABRIDGED RESUME OF THE NORTHEASTERN DENTAL ASSOCIATION.

BY B. J. CIGRAND, B.S., M.S., D.D.S.*

The Northeastern Dental Association, which is formed by the union of the Merrimack Valley Dental Association, New England Dental Society and Connecticut Valley Dental Society, held its eighth annual convention at Worcester, Mass., on October 15, 16 and 17. The attendance was very large, rivaling the National, and the character of the papers and clinic was quite above the usual. The Association, through a most earnest Executive Committee, made it possible to render comfort to the hundreds of practitioners who came from the eastern states. The program was carried out as published, and the meetings were held in the new Women's Club House, the finest of its kind in America. There were twelve essays and thirty clinics, closing with a huge banquet. The dental supply houses made a most credible exhibit, there being thirty-eight booths provided for them, and in this latter aspect the convention set a splendid example in that the exhibits during convention hours were closed, and this gave promise of large and prompt attendance at the sessions.

The guests of the Association were:

J. Warren Achorn, M.D., of the Passe Gymnasium, Boston.

B. J. Cigrand, M.S., D.D.S., Dental Department University of Illinois, Chicago.

John S. Flagg, M.D., D.D.S., LL.B., Harvard Dental School, Boston.

James E. Power, D.M.D., Dental Department Rhode Island Hospital, Providence.

The digests of the twelve papers, together with a brief resume of the splendid clinics, will be given in the order in which they were

*Dr. Cigrand was a guest of the association.—Editor.

announced. The great success of this meeting was due to the business tact of Dr. C. Frank Bliven, its president, and Dr. Waldo E. Boardman, chairman of the Executive Committee.

The initial paper was read by President Bliven, entitled: "Suggestions and Ideals." He said in part:

"Who could prophesy, at the meeting in this city seven short years ago, when this Association was formed by the union of the Connecticut Valley and New England Societies, that in so short a time it would again meet here, and in the interim attained to its present important position in the dental world? Yet the unseen powers controlling its progress have silently accumulated the forces needed for this event.

"Time has calmly drawn together men adequate to its needs, and in this short period it has attained to this position of power. Who can prophesy what its future destiny will be? If it is to march onward in its upward flight, men of courage, genius and power must lend their willing aid to guide it on its course.

"There are many enrolled upon the membership list today who are capable of this service, and success depends upon their cheerful and unselfish devotion to its cause, if it is to fulfill its mission in the East. Those subtle forces that make for certain ends will surely carry it onward and upward; it needs only the wise direction that a loving parent would devote to a child.

"The constitution of this country, promulgated years ago, has stood for this time unchanged, which shows the wisdom of those noble and unselfish men who so earnestly devoted their time to its framing. We can readily see how necessary it is for this Association that care and discretion should be used in framing a constitution and by-laws as permanent as that has been. Are there not men within our ranks today as capable for this work as our country possessed in her hour of need? Is it not possible to have an active committee to frame a much needed constitution and by-laws that will be as great a credit? Its rules must be founded on independent and simple lines, granting to its officers freedom of action, thus leaving them untrammeled in their work.

"All by-laws that restrict this freedom of action and those that have passed into desuetude should be eliminated. Instead of appointing disinterested committees it might be to our advantage to

have a board of councillors. This board should consist of not more than five nor less than three men of foresight and wisdom who shall investigate all important matters coming before the Association.

"Having acquired all the knowledge possible to them upon the important features associated therewith, the chairman of this board should bring the matter before the Association for a final vote; in other words, the establishment of the principles of referendum would simplify and accelerate the work.

"The Northeastern Dental Association, having become an institution, should be managed as are other institutions. Finances should be governed by a committee who would see that the treasury was not depleted by unwise expenditures, thus involving the Association in unnecessary extravagances. The plans of the meeting should be formulated by the president, who shall direct the chairmen of committees in work to be executed by the committee. In no instance should the president be called upon to do the detail work belonging to his executive officers.

"It should not be the purpose of this Association to make money, but to obtain as large an amount as possible, and disperse it all in developing and enlarging its growth. I have no definite idea of the number of societies in the New England States. It is apparent, however, there are too many. The interests of all would be better served if the societies throughout New England were submerged in an interstate association, and there is no better time for such action than the present.

"Section committees should accumulate the subject matter to come before State societies, who might hear and select such essays and clinics as they deemed advisable to bring before the interstate meeting. Such meetings would be of the greatest educational advantage and should be for members only.

"There are many who attend society meetings who never contribute to their success financially, by clinic or essay. They are dead branches of the tree and should be eliminated from the meetings or pay an admission fee adequate to their opportunities. The writer never attended a meeting that he did not listen to a paper, attend a clinic or see something at the exhibits that did not exceed in value the yearly dues incumbent upon each member.

"A dental trust, comprising all New England societies, with

the co-operation of the dental supply houses, and men at its head who will work for the benefit of an institution, and not for self-aggrandizement, could easily secure a membership in such an institution of 1,500 or 1,800 members. The funds derived from such a membership, in addition to those received from the exhibitors, would provide ample means to carry out any plans the Association might deem wise.

"With this membership and the aid of the exhibitors a dental club might be formed with abundant funds to secure a permanent building, centrally located, and provided with every requirement necessary for lecture and committee rooms, space for the exhibitors and provide comfortable accommodations for our members, the exhibitors and guests.

"A place of this nature would lighten the burdens of the officers, who are often at their wits' end each year to secure appropriate buildings in which to hold our meetings. Compared with the present expensive method, and the energy expended, if all profits were eliminated, this scheme must present itself favorably to the mind of any able financier.

"We in New England, by united and constant effort and by independent action, can occupy the position of leaders, becoming the brilliant central star that shall attract to itself all others. Why should we not occupy this position? Since the time when the Pilgrim fathers first entered the harbor at Cape Cod the greatest and most vital interests of our country have had their birth within the boundary of the New England States.

"Contemplating the history of the progress of dentistry in the past thirty-five years we observe that within that period operative dentistry has taken the initiative. This period embraces the most important progress of our profession. Previous to the discovery of the rubber dam very little improvement seems to have been made, but since its advent numerous opportunities for the introduction of new methods have occurred.

"The numerous methods have stimulated other ideas in rapid succession and have been the incentive to greater inventions. These temporary ideals have formed a stairway, leading step by step over the different periods of growth. They point to a higher ideal, to be perceived only by those whose visionary powers enable them,

through their knowledge and deductive reasoning, to foresee that these waves of advancement, resulting in change upon change, each higher than the past, are leading up to a perfected whole.

"Comparatively few men in practice today realize the value of the rubber dam to our profession. Independent of its convenience nothing has been so powerful as a maker of dental history, so that within a generation and a half one might say dentistry has really begun. Previous to its intoduction soft gold was king and amalgam queen, but when a practical method of excluding moisture was found these were forced by rapid degrees to make way for other materials superior to them in artistic appearance and sharing and superceding them in value.

"The practitioner of the present day has very little conception of the skill required by his professional brethren during the years antedating this period. Previous to this time it was considered almost as disgraceful for a dentist to acknowledge that he had amalgam in his office as it is today for him not to possess the ability to perform a successful contoured operation with cohesive gold. The prominent filling materials used in those days were soft gold, amalgan, tin and Hill's stopping, but since the rubber dam has come into prominent use the different materials that have been introduced in rapid succession are numerous.

"This appliance had hardly made its appearance when it was rapidly folowed by the introduction of the dental engine, which has covered a field of usefulness little dreamed of by the man who first introduced it. It has been condemned by some and praised by many. Propelled by motive power other than human energy, with its numerous attachments, it forms a necessary adjunct to every well appointed office.

"I have often wondered if Franklin during his experiments with electricity ever dreamed that it would be used both to create and relieve pain. Picture this man with his kite, key and string, and then follow the ramifications of usefulness of this element that his discovery has created, its important relationship to science, locomotion, manufacturing, medicine, dentistry and art.

"New and various tortures were thought to be the result of improved methods of cavity preparations. That these might cease to be an obstacle to great financial success and professional fame, pain

obtunders of various foms were introduced. To gain desired results varieties of liquids said to possess wonderful powers were advocated, together with methods of hydration. Greatest of all, however, was the hypnotist with his mystical power. Under his magical gaze wonderful operations were to be performed. The purse strings of the public were to be loosened and there was no further fear of unpaid accounts.

"When business was dull the use of this power would gain admission into social circles where the charm of his eye would soon fill his book with appointments and his pocket with that useful commodity which would settle all outstanding accounts and leave a handsome balance in the bank.

"These fads at this time had such a grasp upon our profession that it would seem as if it had gone science and money mad, thereby losing sight of the rarest jewels in the dental diadem, character and judgment.

"During this period of experimentation, in the last third of this epoch, while our profession was pressing onward, a desire for the expression of a higher emotion took possession of the minds of men who formerly confined their efforts to artistic gold formations. They now began to supercede these by such imitations of nature as called into constant usefulness the practical instruments necessity had developed in the past.

"This period may be designated as the practical age, in which strength and durability were considered, and other equally important features were waiting for a fuller recognition. When such perfection had been attained in this direction as to seemingly leave no opportunity for improvement, the artistic growth began to make its desires felt through a demand for the beautiful.

"A few short years ago the artistic colorings of today were unknown. The improvement of this period may also be gauged by the rapid growth of manufactories, their increased facilities, and by a multitude of inventions and appliances formerly unrealized. These establishments have become an important factor in the financial world, involving the interchange of millions of dollars yearly and giving employment to many thousands.

"The concentration of the dental mind en masse today is upon porcelain with its different forms of adaptation. It has become so

enrapt in its earnest endeavors to copy the real that the beauty and perfection of the ideal, which the unconscious mind is seeking to express, is obscured. Porcelain will hold the mind enslaved longer than did Archite cement, because it is more enduring, but, like this cement, it will, in its turn, pass away.

"Your attention has been called to this regime of the past to illustrate our education and growth in the direction of the ideal. Ideals have been formed seemingly perfect that have been continually laid aside for new ones. They cannot be called false, because of the experience gained in our attempt to realize them.

"The prophets of the new time are speaking their message. The false ideals of the past, to be found in repression, physic, stimulants, etc., are passing away and we are living in the birth of the new day. Many preach the doctrine that it will come through dietetics; many believe it will come through athletics, and the cry we hear on every side is 'Lo here, lo there!' Through these may be found the Mecca that shall lead us out of the desert of our present darkness.

"Pure food, pure water, fresh air and exercise are all absolute or necessary, but we must learn the transcendent law of harmony, if the human race in the future is to have perfect teeth. In this harmony of body and mind each cell is nourished through perfect digestion, perfect assimilation, perfect absorption, and last, but by no means least, a natural elimination of waste products. The mind, serene and well poised, controls and guides these physical functions.

"If the ideal, which is a negative one today, is to be made positive, temperate and orderly lives must be led through the establishment of these harmonious relationships. Sex relations and pre-natal conditions must also be considered. The man who drinks intoxicating beverages may preach temperance, but will not be one whit stronger or better for it. It is only when he lives a temperate life that benefit is to be derived from his abstinence.

"So it is with our profession. Not until this life is lived, and our progeny can present to their patients a mouth full of perfect masticating organs, can they set before them the ideal which will command their respect.

"We attempt and accomplish, by expert surgery, the correction of oral deformities. It is time these were passing and we become

past-masters in the laws controlling the creation of a higher type. These disgraceful deformities of an imperfect race, resulting from indulgence, may then disappear. It is within our province to become teachers, possessing the knowledge and power, who will so inspire those who seek our aid that they will profit by our teaching until our race shall equal the perfection of the ancient Greek. Our patients must be taught that the skill of the dentist to save teeth is limited to his ability to make fillings that will exclude the cause of decay from a cavity and to successfully and mechanically correct deformities.

"Every human being has within himself the power of regeneration and salvation. The laws governing these must be learned and practiced by those who desire the ideal to be found only in a jaw automatically perfect, supporting through life a complete complement of beautifully formed masticating organs, free from blemishes.

"Never until we become teachers of truth, the real science of life; never until we become living representatives of a perfected physical body, acquired through an orderly and temperate mind, that the spirit of the divine essence, which permeates this entire universe, may have the necessary condition to function through, can it be said that we are fully entitled to the name we bear."

At the conclusion of President Bliven's address it was voted that a committee of three be appointed to investigate the feasibility of carrying into effect some of the most important recommendations of the essayist.

"Notes on Stockholm" was the title of a paper by Dr. Clinton W. Strang, of Bridgeport, Conn. He gave a very interesting talk on his travels through Europe while attending a number of dental gatherings which were held at Stockholm during the past summer.

Dr. Strang visited Stockholm as a representative American dentist and he took his credentials from the National Dental Association. He sailed for Stockholm in August, and on his arrival found assembled there the Society of American Dentists of Europe, the Swedish Dental Association and the International Federation of Dentists, the latter body being composed of the leading dental educators of the world. He said:

"There were delegates present from every civilized nation, and, although the conventions were in progress at the same time, the

sessions were so arranged as not to conflict with each other and the delegates were afforded an opportunity of attending all the meetings if they desired to."

In the course of his remarks Dr. Strang gave a general description of his travels and the scenes and incidents attendant upon the various conventions. He spoke of the important subjects discussed at the conventions and the pleasure it afforded him to meet and talk with members of foreign dental associations and to obtain their views and ideas.

Dr. James E. Power, D.M.D., next read a very able paper, entitled: "Errors in Diagnosis." The paper was illustrated by stereopticon views. He said in part:

"Science is classified knowledge; art is the practice of those principles afforded by science. The principles of an art are the general truths which are handed down to us by persons who are competent to advise and instruct. When an art is progressive, like dentistry, the principles cannot remain stationary, but must change as the result of scientific investigation.

"These changes must take place gradually; gradually because time must elapse to allow new principles to be proven. In order to determine, therefore, the principles of an art susceptible of constant change and improvement it is necessary to consult the opinion of others engaged in the same line of practice. An adequate knowledge of the principles of dentistry and oral surgery, as thus established, is part of the civil obligation of the dentist. The standard of the judicial estimation of his responsibility in any and every case is the power to apply those principles intelligently in practice; this same standard is required likewise as a professional obligation.

"He who undertakes to practice a profession, whether it be medical, dental or surgical, assumes an obligation, both professional and civil, which has all the validity of a formal contract, as from specialists of medicine and surgery there is required at least that degree of care, skill and knowledge which is possessed ordinarily by those engaged in the same special work. This is regarded by those competent to judge sufficient to qualify us to engage in our specialties.

"If we possess a knowledge of these principles we should be careful in applying them, since we, as a body, have reciprocal obli-

gations to one another. The whole profession is affected to some extent by the errors of individuals. If we consider this carefully we will see that the elevation or the descent of this profession is controlled by its individual members.

"Having selected as our life work the alleviation of the suffering of man in any of its various forms, our first obligation is care in diagnosis. Thus we obtain a solid foundation on which to base our knowledge and skill intelligently. If we possess the requisite qualifications and for any reason fail to apply them, we are guilty of negligence; and negligence where the welfare of our patient is concerned is criminal. Negligence in these cases is criminal from the standpoint of justice and most blameful from the standpoint of professional pride. It is, moreover, fraud, for it is just as much fraud to possess the skill and not to apply it, as it is to endeavor to treat a case without possessing skill, since the possibilities and dangers to which the patient is subjected are in both cases alike. If the attending practitioner overlooks any important step in the care and welfare of his patient, whether he be physician, surgeon or dentist, he is guilty of crime. This should not be overlooked in cases where consultation is for the benefit of our patients.

"When a case comes to us requiring dental surgical interference, and, after treating for a reasonable length of time, the patient does not improve, we are bound in the interest of justice to consult others engaged in the same work and to give our patient the benefit, not only of our individual knowledge and experience, but of the knowledge and experience of the profession in general. Personally, I consider it unjust to neglect even one step in the progressive treatment of a patient, especially when we are selected to treat and implicitly trusted, for then skill, knowledge or lack of knowledge places the patient in a position where he cannot know whether he is being treated correctly or not, until probably his case is beyond the limits of science.

"Of course we, even as professionals, have the civil right to refuse to take charge of a case of oral surgery or of any other branch of dental science, as extraction, etc., provided we have entirely excluded this special branch from our practice. If, however, we profess to practice oral surgery in any of its various classifications, our professional pride should compel us to

treat all cases in this line. I mean that we should not select our cases—for instance, if we are reasonably sure that our patient will get well, take charge; and refer the case to somebody else if we think it will be of long treatment and uncertain result. This sort of dealings should not exist; our personal and professional pride should prevent it, and if we are willing to receive all the praise, etc., which sometimes is associated with good results, we also should be willing, as men, to assume the responsibility which is associated with the less fortunate results.

"In diagnosis, prognosis, operation and after-treatment, the dentist alone is responsible. In consideration of these facts we must follow the line of treatment we think best and not allow ourselves to be unduly influenced by the opinions of others. Every step should be taken only after careful and judicious deliberation; this insures good results and leaves no ground for the charge of ignorance or neglect, both of which bring identically the same result.

"Our examination should be historical, instrumental, visual and manual. We should impress upon patients how much rests upon their statements and should not trust to these beyond a reasonable degree for frequently, for unknown reasons, they try, and sometimes succeed, in deceiving by misstatements as you will see in case number one.

"If other men have treated any case with poor results (as these cases which I will show you tonight), too much stress should not be laid on their diagnosis, for after we accept the case our responsibility is individual. We should be guided, but not governed, by their diagnosis. The fact of any reputable surgeon previously treating a case requiring dental surgical skill should not prevent us from accepting this same case, for we, as special surgeons, should be expected to better understand a special case than the general surgeon.

Once we accept a case, regardless of the amount of money we may get in return, whether it be hundreds of dollars or one dollar, our obligation to the patient is identically the same. We may, as I stated earlier in my paper, refuse a case, but if we accept it the contract is formed without words or writing and says, 'You shall give to your patient the very best attention possible.' When we receive money for our services it is a man to man transaction and

in the light of justice we give something for something. The motive that inspires us to do some work for charity, as we call it, is either sentimental sympathy or a recognition of God's goodness to us. As to such sympathy you will agree that our feelings soon become dulled in actual practice. On the other hand, it is certainly a most consoling assurance that one can offer some free work to the poor in recognition of the Divine Providence in conferring upon him whatever talent he may possess.

"Although it is generally supposed that errors in diagnosis are due, in a great majority of cases, to carelessness and inattention, we sometimes have cases where neither of these is the direct cause. In the cases which I will show you tonight let each man remember that some errors in diagnosis cannot be assigned to any one person or cause."

[TO BE CONTINUED.]

HIGH FUSING VERSUS LOW FUSING PORCELAIN.

BY W. T. REEVES, D. D. S., CHICAGO.

Read Before the Wisconsin State Dental Society, July, 1902.

Mr. President and Members of the Wisconsin State Dental Society:

In presenting a paper on this subject for your consideration today, I do so with two objects in view: First, to clear the atmosphere for the uninitiated in porcelain of what must seem to them a befogging difference of opinion among porcelain workers, as to materials and manipulation, as advocated in papers and discussions before dental societies, and printed in our leading dental journals in the past few years, and to try and start them on the right road, that, if followed diligently, will lead to success; second, to give added stimulus to you who are workers in porcelain by showing you an ever increasing scope for the use of porcelain as a filling material, as you gain experience in its use and the confidence that comes from a more extended use, and by comparison of materials and methods to bring out what is best, and to give you some new principles that are fundamental principles in inlay work, that, if studied and followed, will give you increased success in this work.

High fusing versus low fusing is a great bone of contention. In

all combats, controversies or arguments one must have an adversary as well as a principle to combat; and that the low fusing contingent may have as strong an advocate as I know of, I have taken the paper read before the Second District Dental Society in Brooklyn and the Boston and Tufts Dental Alumni Association last December by Rodrigues Ottolengui, M. D. S., and printed in the April number of the *Items of Interest*. Dr. Ottolengui is one of the most forcible and brilliant writers in America and an enthusiastic advocate of the Jenkins bodies and methods, and if I did not believe I had the best end of the argument, I would not voluntarily seek so strong an adversary. I have a great admiration for Dr. Ottolengui, and whatever is said in the way of criticism is said with the friendliest feeling and in criticism of material and methods, and nothing personal toward him or Dr. Jenkins.

There is a common ground that we all stand on, regardless of the creed we believe in—that is availability and compatibility. Availability has been well handled in a conservative way by Dr. Ottolengui, and I indorse in the main all that has been said on that subject, and would only criticise the limitations that have been placed on porcelain. I believe that porcelain as a filling material is only limited in availability by the limitations of the operator to perform any given case in hand. As an operator acquires skill in making and inserting porcelain fillings, he will successfully advance from one class of cavities to others more difficult, until he handles easily and successfully those that at first seemed impossible, and as he overcomes one difficult case after another, he will gain the confidence and skill that will enable him to restore the worse broken-down teeth to full contour and usefulness with porcelain fillings, and thus practically place no limitations on porcelain as a filling material.

I speak of acquiring skill advisedly, for there is no work that the dentist does that requires such painstaking care at every step as the making of a porcelain inlay, and the technique cannot be mastered in a week or a month, but must be a year in and a year out study, for each case presents a different problem and new possibilities, and in no work we do does the saying "eternal vigilance" apply with such force as in inlay work, for the operator can never

let himself down from the highest plane attainable. There can be no medium or indifferent work, no slighting or hurrying at any step, or a failure would be the result. It is the one work we do that the operator knows beforehand whether it is a success or not. An inlay must be a perfect fit or it should never be set. It may be an indifferent match in color, but if a perfect fit it will do perfect service to the patient. In this way it will cultivate a high moral tone in the profession, for no one is worthy of being a member of a liberal profession who will knowingly complete an imperfect piece of work.

Compatibility is a common ground for us all, but has never been recognized as one of the best qualities of porcelain as a filling material. It is a quality that no other material we use possesses, and consequently is no wonder that it has escaped mention if not the notice of inlay workers. Dr. Ottolengui touches on it in speaking of "advantages of porcelain in saving teeth," but does not give it the distinct place that it possesses, or the credit to porcelain of a quality that to my mind is one of the greatest qualities that a tooth restoring material could have.

Compatibility of material to tooth means a great deal. If nature could, after the removal of all carious portions of the tooth, restore to full contour by building in dentine and enamel as she restores in other parts of the human economy, waste or loss, it would be the perfection of restoration, but nature cannot do this. Porcelain does this very nearly to perfection, so nearly that the eye cannot detect the artifice, and all the functions of the tooth are restored to a normal condition, with the one exception of sensation in the restored portion, but as long as caries does not attack porcelain it does not need that quality in order to warn the patient of impending danger.

A few statements that apply to inlays in general I want to take exception to, one to emphasize and then quote the Doctor in full on what he says about "advantages of porcelain in saving teeth," before passing to the strictly high and low fusing phase of the paper. The Doctor says: "American dentists and American patients have a different attitude towards the porcelain filling. Both admit that it is beautiful. But the patient, accustomed to the gold filling, which, properly made, is looked upon as a final operation,

when the idea of porcelain is suggested, almost invariably asks, 'Will it last?' And with the exception of a very few men, who seem to have overstepped the bounds of discretion in adopting this new method, the question proves embarrassing to the dentist."

As one who is not embarrassed by this question, I take exception in behalf of those hit at, that we have overstepped the bounds of discretion, and to also answer the statement appearing in the next paragraph: "Very few Americans as yet ask us for porcelain fillings. Such as are made are inserted upon the suggestion and by the advice of the practitioner, and in spite of the query, 'Will it last?'" I have been putting porcelain fillings in since 1893. For about the first five years I only put them in for those who asked for them, and at their own risk, they having seen the work in some patient's mouth and wanting the same for themselves. As the number increased and I became more proficient in the work, the scope of cavities enlarged until it embraced all parts of the mouth. The result of the more extended use was the proving them to be the most permanent of any fillings those patients had. It was only through a slow, cautious, and careful use of porcelain that it has become the chief material I use today, and why I am not embarrassed to answer the question, "Will it last?" And also why I place it first instead of second as compared with gold.

On the same page in the last paragraph the Doctor says: "In spite of the artistic influences of Europe, I cannot abandon the theory that the dentist's *first* duty is to *save* the tooth, and that it is but a *secondary* demand that it shall be done in an *artistic* manner." I cannot indorse that sentiment too strongly, for that is what I believe in first, last, and all the time, and that is why I recommend porcelain, because I know it will save more teeth under more varied conditions than any other material we use.

The Doctor seems to have lost heart and then to have regained his courage. I will quote without comment other than to predict that within five years he will place porcelain second to none, particularly if he adopts a high fusing porcelain for making his inlays. He says: "I believe that the radical, impetuous use of porcelain will within five years leave the method hidden away on the top shelf of abandoned practices, alongside of cataphoresis and copper amal-

gam. On the other hand, I firmly predict that a conservative application of porcelain fillings will show an increasing use of the mode, giving it a permanent place, second only to gold; for, despite my admiration for porcelain, I will not permit myself to forget that the cornerstone and foundation of successful American dentistry is the permanent contour gold filling."

Continuning under "advantages of porcelain in saving teeth," the Doctor says: "Viewing porcelain, therefore, from the American standpoint, where, when, and how shall we use it? Perhaps its chief attractiveness will always be its resemblance to tooth substance, but I would call your attention to other important virtues, two in particular: First, it is a poor conductor of heat; second, it is made out of the mouth and inserted complete. Either of these, and especially both combined, will in many instances elect porcelain to a precedence over all other materials.

"Let me speak of it first from the aspect of its poor conductivity. While modern practice preaches that the dental pulp is often better out of than left in a tooth, this very dogma has arisen from the fact that a metallic filling in close proximity to the dental pulp endangers the vitality of that organ. It is because of the constant death of pulps under large gold or amalgam fillings, with consequent abscesses, that we have come to see that, in many instances, and, considering the perfection of antiseptic treatment today, it is a safer and a wiser proceeding to remove the pulp prior to inserting the filling, rather than to risk its sudden death and infection of the apical regions. This is undoubtedly sound doctrine, but it is applicable only in proportion to the age of the patient. That is to say, the younger the patient the less excuse have we for intentionally devitalizing a pulp. In view of this self-evident fact, even the most radical destroyers of pulps bend every energy towards the conservation of the pulps in young teeth, and to this end they pin their reliance to temporizing with plastics. Here, then, we arrive at a point where even the American dentist discards gold and utilizes a material which is perishable in the environment. Here, then, we find a class of cases where porcelain must appeal to us, not because of its beauty, but because it is more permanent, and more conservative of the health of the tooth, than any other material in our cabinets.

"Coming to the second advantage, the fact that the filling is made out of the mouth and inserted quickly and in one piece, we find that once more it appeals to us in exactly those places where we reluctantly discard gold. That is, there are many localities where, because of the time required for a gold filling, it would be impossible to maintain dryness of the cavity sufficiently long to permit us to insert a perfect gold filling. Many such cases will occur to your minds, so that I need but mention a few. Some of the most beautiful fillings that I have seen made by Dr. Jenkins have been along the gum margins, on the buccal surfaces of lower molars, the fillings being half under the gum. We all have had the experience that even after the use of gutta-percha or other packing to push away the gum, we have met such a flow of saliva as to preclude the successful use of gold, so that we have been compelled to rely upon amalgam. Here it is possible, it is wise—nay, I will say it is the very best practice to use porcelain, and yet it is a situation where the beauty of the work is absolutely unimportant. In true American fashion we choose it because it is the most durable and the most useful material.

"Another difficult position is where the improper use of clasps has resulted in abrasion and subsequent caries about the necks of molars, usually extending below the gum, and commonly very sensitive to the touch. Amalgam is the common reliance, and too often the electro-chemical action caused by the contact of the gold clasp with the amalgam filling leads either to reappearance of caries or death of the pulp. Here is a place where porcelain is useful, both because it is a non-conductor and because it is made in a single piece and may be quickly inserted, requiring a minimum period of dryness."

Next the Doctor speaks of the use of pink porcelain for those cavities that occur on the root, following extensive recession of gums. Here I differ with him. I have never seen, either in crown, bridge, or inlay, where pink porcelain had been used to restore absorption or recession of gums and had to set against natural gum tissue but that it showed up as plain as black and white. I believe a more artistic effect and less conspicuousness is secured by making that portion of the inlay that should be covered by gum

tissue to look like root in contour and color and let the effect be denuded root rather than several colors of attempted pink gum. I have some samples that will show what I mean by this treatment of such cavities; they will be exhibited at my clinic.

Again the Doctor says: "I believe that there is a general feeling throughout the country that the high fusing porcelain is the more reliable. This has come about by the constant repetitions of a few writers favoring high fusing bodies." Again he says: "I have endeavored to make matrices with platinum, some being in one instance furnished to me by Dr. Head, from which I may argue that I have experimented with the proper kind of platinum. In my hands, at least, the platinum matrix limits the use of porcelain. * * * But I find, and think the fact cannot be disputed, that in proportion as the size and depth of the cavity increases the platinum becomes less and less a possibility. This, if true, entirely discounts the high fusing method, for the only advantage that even its most ardent admirers make for high fusing material is that it is stronger, which, however, is not true. But for a moment admitting this, we must allow that in proportion as the porcelain is exposed to the stress of mastication, the demand for strength increases; yet it is exactly in compound cavities that the platinum matrix becomes increasingly inaccurate in relation to the extent and depth of the cavity."

In the foregoing he says the only point that high fusing advocates claim is strength. At least it is as strong as Jenkins' body, and it may be stronger. Both, I believe, are strong enough, and as that is the least of its many points of superiority, I will pass that over without argument.

His great bugbear seems to be the burnishing of platinum into extensive cavities. I claim this for platinum: That wherever anyone can burnish gold into a cavity to form a matrix, I can burnish platinum and will have as perfect or a better matrix, and that there are a great many extensive compound cavities in which I can burnish platinum and make a perfect matrix; that if gold were used, even if they succeeded in removing the matrix from the cavity, it would be so frail that subsequent handling while baking the inlay

would warp and bend it all out of shape, so that it would be absolutely no good as far as fit is concerned.

Platinum can be burnished anywhere and everywhere. It takes a little more time, but when completed it has a rigidity that enables you to handle it freely with perfect security as to changing shape. In difficult cavities I will burnish a matrix from start to finish in from 15 to 20 minutes. Suppose it takes 50 per cent more time; the more perfect results you obtain from a platinum matrix more than pay you for the time spent in burnishing. The point he makes for gold is a still stronger point for platinum—that of being able to overlap the tooth with the matrix, so as to give you an impression of the tooth as well as of the cavity. You can overlap platinum on to the tooth to any extent, just so that it don't go beyond the bulge and bind itself in, and it will be rigid, so as to be of some benefit to you while building, carving, and contouring your filling.

Translucency is one of the main features desired in inlays or fillings. Jenkins bodies are opaque, hence you cannot make a translucent, natural looking inlay with them. High fusing bodies are translucent, and by building your inlay up in layers you can handle your colors so as to give a perfect, natural looking, translucent inlay.

This one point is enough to establish the superiority of high fusing over low fusing bodies, but there are other points. Here I want to give you a fact or principle that has been overlooked by inlay workers, and it is one of the greatest points in favor of porcelain as a tooth saving material. Gold, either in the form of filling or crown, no matter how highly polished, will tarnish and retains fine particles of food deposit and increases the liability to decay of approximating tooth surfaces. Normal enamel is attacked by the acids of the mouth and roughened, and will then retain increasing amounts of food deposit, and caries follows. But porcelain, with the glaze of the furnace, will not retain any deposits in the slightest degree, and is not affected by the fluids of the mouth. Therefore that tooth that has for contact point or approximating surfaces the glazed surface of a porcelain inlay is protected from the liability to decay to a greater extent than it was originally.

On this clinical fact I base this statement and make a strong point for high fusing as against low fusing. *Inlays should never be ground on any surface other than the occlusal surface of molars and bicuspids and the cutting edge of the anterior teeth without being returned to the furnace and glazed before setting.* High fusing bodies are the only bodies that you can build up contours, carve and shape and will retain those shapes under the heat of fusing, or if you have over contoured, you can grind to desired shape, then put into the furnace and glaze with the certainty that it will be that shape when it comes out. All low fusing bodies have a tendency to take a spheroidical or globular form in fusing, just the same as solders do, hence the wart-like appearance of inlays made of Jenkins body and the consequent necessity of grinding them after they are set and then polishing them. The Doctor says: "I also find that after setting a filling, should it seem requisite, the margins may be polished with strips as safely as where metallic fillings are similarly treated."

You see their claim is a boomerang and that the necessity of grinding their margins down to the plane of the tooth destroys one of the best qualities of porcelain as a tooth saving material.

The Doctor under "Method of Construction" says: "A necessary result has been that the sole relience for retention has been the so-called cements. The failures of porcelain have been almost exclusively due to the failure of the cement. * * * Having the advantage of observing Dr. Jenkins at work, I noted the manner in which, with diamond-copper disks, he cut grooves in the porcelain, and I saw at once the advantage of his method, as well as the fact that it had never been adequately explained in print;" and further on he describes a new cavity formation with the hope that he has solved the problem. The new cavity formation he suggests he likens to the "sliding cover of a wooden box."

I want to answer all of these by giving you what I think is the true reason why inlays or restorations stay, a new principle that clinical experience has demonstrated.

Close adaptation and the medium of completing the close adaptation crystallizing under pressure. You take two sheets of glass

whose surfaces are adapted to each other and place water between as a means of excluding all the air and completing the close adaptation, and you cannot forcibly pull them apart. A joiner prepares the surfaces of two pieces of wood so that they are in close adaptation one to the other, places glue between and clamps them together and leaves them to harden. There is no strength in the glue; if there was any appreciable amount of glue between the boards there would be no strength in the joint. It is on the same principle, I believe, that inlays depend for their strength of retention. If this be true there is no need of cavity formation such as described, no need of inflicting the pain on the patient that would be occasioned by the additional cutting such formation would necessitate. Cavity formation should tend to simplifying the task of making a matrix, while this style of cavity formation would seriously affect the chance of being able to withdraw the matrix without distorting it.

Dentists through all the years have been brought up on one law of physics: Self-retention form of cavity and interlocking form of filling; and it seems almost impossible for them, or inlay workers either, to break away from this law.

That there are other laws of physics that dentists have never made use of that would be of great benefit if utilized there is no doubt. That this law of close adaptation is one of these that is destined to be of great benefit to dentists I firmly believe, and the more it is followed the more confidence in porcelain fillings will be the result.

What strength can there be in a line of cement that would fill any groove you can cut in the reverse side of an inlay? I believe that just to the extent that you groove the inlay you have weakened the strength of retention. All inlays, large or small, extensive restorations in molars and bicuspids and corners and tips on the anterior teeth, I etch the reverse side with hydrofluric acid, which removes the glaze and leaves a slightly roughened surface, without changing the close adaptation to interior of cavity as well as at the margins.

I will close by quoting the last sentence of Dr. Ottolengui's paper; the Doctor says: "While I believe that in numerous instances porcelain may and should be selected because it is the more

artistic material, I also believe that those who take up its use first in those localities where it can be relied on as the most permanent and most healthful conserver of the teeth will learn by their experience and gain such skill in manipulation and management that, when they essay the use of the material mainly as a beautiful restorer of lost tissue, they will achieve a higher success, a more permanent result for their patients and establish a more lasting utilization of porcelain as a filling material."

DISCUSSION.

Dr. W. H. Cudworth, of Milwaukee, was called upon to open the discussion.

Dr. W. H. Cudworth: Mr. President, gentlemen and ladies, of the Wisconsin State Dental Society: Dr. Reeves should be highly commended for the paper that he has given us today on porcelain fillings. Further than that I entirely differ with him from first to last. The title of his paper was "High Fusing vs. Low Fusing Body." As a matter of fact, he has given us no figures, no statements, which could be disputed or controverted in regard to the two materials. Before I go further I wish to say that to Dr. Reeves I owe a great deal of my success in porcelain inlays. He has some ideas in making porcelain inlays that lead all porcelain inlay workers of this United States—and I claim the porcelain inlay workers of the United States are superior to all. His paper was almost entirely a reproduction of Dr. Ottolingui's paper, or quotations from Dr Ottolingui, in the April number of *Items of Interest*.

Dr. Ottolingui, as you all know, when the question of porcelain inlays was first broached before the dentists of the United States, was heartily in favor of the Consolidated people's inlay material. That was the first that he took up as a material to work upon for inlay work was the material that was produced by the Consolidated Company, of New York, Chicago, and various other places. Now, in all Dr. Reeves' paper he does not leave very much of an opening in regard to this matter. We are all working along the same lines. He produces magnificent work in his line, and I honestly believe that the making of inlays by different men is about the same thing

as making gold fillings by men that use different preparations of gold. We arrive at the same conclusion—or we arrive at the same successes—by the use of materials in which there is practically very little difference. Now, Dr. Reeves, as I understand it, uses Mr. Brewster's enamel bodies for his inlays. He uses the foundation material Brewster has put out for his inlays and covers that with the enamel body. The profession at large owes a great debt of gratitude to Dr. Reeves for the method that he has put forth in the securing of perfect coloring to porcelain inlays. Just about a year ago I met Dr. Reeves for the first time here at the National Convention; and it was the few words that he said to me at that time that have brightened the pathway I have taken up in the specialty of porcelain inlays. He did not touch upon the topic at all today of matching the tooth and your filling. As I understand it, he uses the basal color of the tooth. He matches basal color of the tooth to produce the proper coloring of an inlay. He says that low fusing bodies are opaque. I disagree with him, because I have taken up his system of matching colors. I use Dr. Jenkins' material exclusively in inlays, and I follow the same system that Dr. Reeves does in matching colors, matching the basal color of the tooth, and reproducing the enamel by successive layers of lighter colored or different colored bodies to match the color of the tooth, and the reflected shadow of the basal color produces the matching of the inlay to the tooth.

Now, as to the burnishing of a platinum matrix as against the burnishing of a gold matrix, I claim this: It is absolutely impossible for any man to burnish a platinum matrix to as close an adaptation as he can a gold foil. This is an absolute mechanical impossibility. We all know, if we stop to think for a minute, the difference in the ductility of the two metals. There is one thing Dr. Reeves has not taken into consideration, and that is the drawing of his matrix from the cavity. My method of procedure is very different from that of Dr. Jenkins. After I have obtained the adaptation of my matrix to the cavity I fill it with wax before I withdraw it from the cavity, and thereby insure the perfect removal of my matrix. After it is drawn from the cavity my matrix is invested in plaster and powdered silex, half and half, the wax

boiled out, and when that matrix has been entirely invested it is absolutely impossible for it to warp out of shape by the shrinkage or drawing of the porcelain.

This is something that cannot be done with the platinum matrix. The point in regard to adaptation made by the men who use the platinum matrix is that after the first baking they can replace it in the cavity, and the second burnishing will make a perfect adaptation, but there is no high fusing body made that will not warp or draw the matrix at the second fusing or third fusing, whatever it may be.

As to the matter of the strength of the two materials, Dr. Reeves is again misleading in his views, because he uses the Brewster body, which comes nearer to the low fusing body than any high fusing body made. The terms "high fusing" and "low fusing" are very much misunderstood by the profession at large. As we understand, the high fusing body, or the example that we have of the high fusing body, is the American tooth, for instance. The American tooth in itself is not a perfectly fused material. That is, I mean to say, that all of the ingredients that go into an American tooth are not fused. The silica put into the American tooth to produce the body of the tooth is simply held together by fusing felspar and calin, which holds that as a flux. Now, I claim for our low fusing body that we have a perfectly homogeneous mass, which you can cut with Arkansas stone or garnet disks or cuttlefish bone, and make a perfectly smooth surface that is as absolutely impervious to the fluids of the mouth as the high fusing body is, which they cannot grind or polish after it is set. As to the matter of resistance to stress, I will not touch upon that phase, but I have a little statement here that I wish to make as regards high fusing and low fusing bodies as we know them in this country. These tests were made by Prof. Kayser, of the Royal Saxon Institute of Building and Technology, in February or March. All of you who have read the "Cosmos" know that this is an official statement made by disinterested parties, and which can be entirely vouched for, because it comes from people who, as I said before, are entirely disinterested in the matter. Dr. Jenkins caused to be sent to this gentleman seven varieties of porcelain. Among those were the Close, the Close-Whitely, the Whitely Inlay, the Whitely Special, the Con-

solidated Inlay, the Consolidated Continuous Gum, and the Jenkins Porcelain Enamel. The first test was for specific gravity. I will take first the Close. Its specific gravity was 2.223, the Close-Whitely was 2.249, the Whitely Inlay was 2.225, the Whitely Special was 2.171, the Consolidated Inlay was 2.267, the Consolidated Continuous Gum was 2.132. The Jenkins Porcelain Enamel was 2.332, which gives us one hundred and some odd degrees greater than any other material used.

Resistance to pressure: The Close average from two experiments was 712.5 kilograms, or 567½ pounds' pressure. The Close-Whitely was 225 kilograms. That was stated by Dr. Ottolengui as being superior to all inlay material ever given to the profession in this country or any other. It gives the least resistance to pressure, 225 kilograms, or 525 pounds. The Whitely Inlay, 430 kilograms, or 946 pounds. The Whitely Special, average of two experiments, 787 kilograms, or 732½ pounds. The Consolidated Inlay, average of two experiments, 460 kilograms, or 1,012 pounds. The Consolidated Continuous Gum, 520 kilograms, or 1,254 pounds. The Jenkins Porcelain Enamel, 924 kilograms, which in American figures gives us 2,032½ pounds, which is a little over a ton pressure. Those samples which were given to this gentleman for tests were one centimeter square and two and three-tenths millimeters thick, about one-tenth of an inch in thickness and a little over a quarter of an inch in diameter, measured by the American system. I think that test shows that we have in Jenkins Porcelain the strongest porcelain that has ever been given to the profession, and that is a low fusing body; it fuses between eight and nine hundred degrees centigrade, which is between fourteen hundred and fifteen hundred degrees Fahrenheit, about the fusing point of the Ash tooth. Dr. Jenkins took as his example to work up from, to produce a porcelain inlay material, Ash's tooth, as the only tooth that has been produced by any manufacturer which you could cut and polish and have the same surface after the polishing as you would have at the glaze of the furnace.

As to the degree of brittleness, if we consider No. 7 as representative of the highest degree of brittleness, the order would be as follows:

No. 7, brand, Close-Whitely.

No. 6, brand, Whitely Inlay.

No. 5, brand, Consolidated Inlay.

No. 4, brand, Consolidated Continuous Gum.

No. 3, brand, Closes, which has always been considered the strongest possible body we could obtain, either for crown work or inlay work. Close is clear down at No. 3.

Whitely Special is No. 2.

Jenkins Porcelain Enamel is No. 1.

Gentlemen, I think it goes without saying that the low fusing body, as represented by the Jenkins Porcelain Enamel, is superior to any that has been put before the profession in this country or any other. Jenkins Porcelain Enamel, treated in the proper manner, has all these advantages that anyone can claim for any porcelain inlay material. We can bake closer to the line, we can make a more perfectly adapted filling by Jenkins' porcelain material than we can by any other. We can restore the contour of any tooth. It has the quality of allowing us to build out the contour corner and to reproduce the cusps and reproduce any formation we wish in an inlay. It has the quality of reproducing the color, and when I say "reproducing the color." I agree with Dr. Reeves, because by no other method is it possible to reproduce the color of any tooth in inlay material. His method is to imitate the basal color of the tooth. I take off my hat to Dr. Reeves, for I have had greater success with my inlay work since I came in contact with the gentleman a year ago, and I have experimented with inlay work ever since it was brought before the profession. We have the advantage of being able, after our inlay is set, to grind the edges, and polish the edges of your filling flush with the tooth itself, which has always been a strong feature of any filling material which dentists put in. We have the advantage, in Jenkins' material, of being able to grind and polish flush with the tooth, which we cannot do with the high fusing material. It is absolutely impossible, because it is not a homogeneous mass, except in the Brewster body. We also have the advantage over the Brewster body, inasmuch as it does not shrink as greatly as the Brewster body. In a little test I performed in my office here a few days ago I took two matrices, swedged on the

same die, and baked the Brewster body in one and the Jenkins body in the other, and I baked six times to fill my matrix under the Brewster body and four times to fill my matrix under the Jenkins. Gentlemen, I thank you.

DR. A. HOLBROOK: How about retaining your fillings in the cavity?

DR. W. H. CUDWORTH: As a matter of fact, the retention of the filling with either the high or low fusing body is about the same.

Contrary to a great deal that has been said by my colleagues here in town, I have the greatest confidence in Harvard Cement in retaining my fillings. The formation of my cavity is the same as Dr. Reeves' and the same as all inlay workers. We have to have a cavity that will admit of the withdrawing of the matrix. I never make any undercuts in my cavity after the inlay is made. I take a small sharp-edged carborundum wheel. I don't cut the "collar button" formation which Dr. Jenkins recommends, but I simply grind off the gloss and at the deepest portion of the filling I cut just a little deeper groove, not enough so it would be really called a groove, but go down a little bit, take the gloss off the side of the filling that comes in contact with the cavity with this carborundum wheel. I do not believe in the use of copper discs loaded with diamond dust, because copper, as it accumulates on the porcelain, is very hard to remove; consequently I use the small carborundum disc to cut what little grooves I use for retention. (Applause.)

Just one point more, gentlemen, I want to make here: We all know Dr. Wedelstadt, of St. Paul. We all know he is a crank on gold fillings. He thinks that a tooth that is not worth filling with gold is not worth anything in the mouth. Three years ago last September it was my pleasure to meet Dr. Wedelstadt at the Minnesota convention at Minneapolis, and he just ripped us fellows up and down the back in great shape. He didn't think we had a right to be on earth. I have a letter today stating that Dr. Wedelstadt and Dr. McNamara, of St. Paul, have made experiments with the various porcelain inlay materials that we have today, and Dr. Wedelstadt gives the preference to Jenkins' Porcecelain Inlay Enamel over all others, from experiments he has

made, tests as to strength, tests as to color, and tests as to adaptability to the cavity.

DR. H. L. BANZHAF, Milwaukee: After listening to the very able presentation of this subject by the essayist, and the discussion by Dr. Cudworth, I am more than ever convinced that Dr. Jenkins is entitled to more credit and consideration along these lines than any other man in the dental profession today, and to him we owe an everlasting debt of gratitude. I think most of us are willing to admit that the degree of proficiency attained in any line of work depends upon the interest we take in that work. I am free to confess that up to the present time, when I chose to make an inlay it has been for esthetic reasons mainly, or, in other words, when the desire of the patient for artistic effects has outweighed all other considerations. I do not care to say anything in criticism of the Jenkins body; and I certainly do not care to criticise my friend Dr. Cudworth, for whose ability as a porcelain inlay worker I have a very high regard; but, gentlemen, I do not like a negative character. I did not care to say very much, but I think one might as well be classified at least. I believe in the high fusing body for porcelain inlay work; first, because I think it is stronger, and second, I think the artistic effects do not compare with low fusing bodies, in spite of what Dr. Cudworth has said. I find that the inlays constructed with the Jenkins body have a decided opacity, or death-like appearance, which is certainly a great contrast to the lifelike or virile appearance of the high fusing body. The essayist says something about the furnace fuse or a polished surface. A great deal has been said about the reasons why there is so little recurrent decay of teeth along the cervical margins under porcelain, and it occurred to me just at this time, that it was not the cement, nor the porcelain inlay, so much as the polished surface of the material which had to do with the non-recurrence of decay. I think it is this polished surface which renders the parts mechanically immune.

Dr. Cudworth gives us a list of specific gravities of various materials. I am glad this matter came up at this time. I think in my discussions with low fusing body men their claim for strength has always been in the density of the material; and from the fact that Dr. Cudworth speaks of the specific gravity, which

stands for density, I think we might as well take the discussion of that matter up right here. I do not think density has very much to do with the strength of a porcelain body. I am inclined to think it is a factor, but only a factor. If the density of the material had anything to do with its strength you might as well say that lead would be much stronger than steel, because we all know that lead is nearly twice as dense as steel. I think the specific gravity of lead is something like eleven and steel something like six and a fraction. We know how easily lead is pulled apart. We know that platinum is the most dense of all materials. Surely no one would claim that platinum is the strongest of all metals. The one point I wish to make is this: That the density is only a factor, and I do not believe that it is in density where we gain our strength. I honestly think it is the molecular cohesion, and nothing more or less. I believe it is not the cement which holds the inlay in position, but rather the capillarity of the cement crystallized under pressure.

I want to say a word about matrices. Dr. Cudworth says he doesn't think that a matrix can be made of platinum that will adapt itself closely to the lines of the tooth I differ with him there also. One thing that the gold matrix men will all say to you is this: "Isn't the material more ductile?" But because it is more ductile I do not like it. I do not say that Dr. Cudworth cannot use it, because I have seen him tease a matrix out of a cavity.

Dr. W. H. Cudworth: I never "tease" a matrix out of a cavity but what it is absolutely held in place before I tease it.

Dr. H. L. Banzhaf: Now, I have not been successful with gold, but do not say it is not all right to make matrices out of gold. I have not been successful with the gold matrix because of its ductility. I say the thickness of the material has very little to do with it. I have been more successful with the use of the platinum matrix, one in one thousand, because of its rigidity. Yet it is sufficiently pliable to answer all purposes.

As to grinding inlays, I think that is one of the things we ought to avoid. As Dr. Reeves says, we ought to have a polished surface. In conclusion I want to say just one thing: All those that know me know I am more or less of a crank or en-

thusiast on the subject of porcelain. I am willing to admit this, however, that the doctrine of judgment and discretion is a pretty good thing to keep in mind in the application of porcelain and porcelain inlay work.

Dr. W. H. Cudworth: I do not want to take up all the time on the discussion of this subject, but Dr. Banzhaf has brought up some few little points which I notice I did not touch upon. He speaks about getting the matrix out of the cavity. Now, as I said before, my method entirely differs from that put to the profession by Dr. Jenkins. After I have obtained the proper shaped cavity I burnish into my cavity a number 30 gold foil, which is just one-half less in thickness than the finest platinum foil you can use. After that is perfectly burnished into the cavity I fill that matrix with sticky wax, using Sibley's wax, which is the best of the sticky waxes. I put the syphon into my patient's mouth and I make that absolutely cold. I do not "tease" the matrix out of the cavity. I take it out in its absolutely original perfect form. That matrix is then invested in plaster of paris and powdered silex, half and half. I use a large enough piece of gold foil so that it covers labially and lingually, and reproduces the form of the tooth labially and lingually. I have enough of that foil so that it is deeply engaged in my investment, and it is absolutely impossible to change the form of that matrix.

There is another thing that I failed to make a note of in regard to porcelain fillings, and that is its adaptability to soft teeth and children's teeth. I have saved, since I began to use porcelain inlays, more six-year molars than I ever saved in my life before, by using Jenkins' Porcelain Enamel, because I could give them a filling that would resist the wear and tear of mastication, because I could give them a filling the walls of which would not break down.

Dr. B. G. Maercklein, Milwaukee: I desire to speak only on one phase of this subject, which has been referred to by the essayist, and that it is in connection with the subject of cavity preparation. I have been myself in the position of the Irishman, who had incidentally and accidentally been chosen to decide the proper pronunciation of the word "*e*-i-t-h-e-r" or "e-*i*-t-h-e-r," and his

decision was to be final. "Gintlemen," he says, "it is 'naything,' for it is 'ayther.'" I desire to emphasize this point in regard to cavity preparation. A great deal has been said in connection with the porcelain inlays and their ability in the direction of the preservation of the cervical walls of teeth that have failed under other materials. The credit is given apparently to the porcelain or to the cement, when, in my opinion (and I do not state that positively according to Dr. Peck), no credit has been given to the peculiar cavity preparation, which is probably more largely the cause of the preservation of those teeth at that particular point than any kind of material.

I remember that I advocated the abolition of the under-cuts in filling here before this society at least ten or twelve years ago, and I believe I offered to insert a gold filling in a cavity on any surface of any tooth that was as deep as it was wide, and its surfaces absolutely parallel, without any under-cut, and insert that gold filling so firmly and solidly that it could not be displaced by any ordinary instruments, or by any force of mastication. Now, are not we arriving at somewhat that same condition on the subject of inlays? Are not we preparing our cavities almost parallel or more or less in line with the enamel cleavage, or enamel prisms, and are not we arriving at that same result? Are not we likely to give the inlay the credit for the work we are doing in cavity preparation? I referred to that same subject four years ago before this society in that same manner, when I gave a clinic in gold fillings, the subject of which, Dr. Fee, is sitting right here. The tooth had been pronounced too soft for gold material. It had been filled five times by four different dentists, and pronounced so far gone that the only thing to be done was to devitalize and crown. The tooth was prepared without almost any under-cut, because the failures were all under-cuts and nothing else, making the edges of the tooth so frail that failure was inevitable. The tooth was filled with gold and has stood now four years, better than any of its predecessors had done. I do not lay that to the gold, nor to the inlays, nor to the cement. I lay it to the difference in the standard of the work and the preservation of the tooth substance; simply to the difference in the preparing of the edges of

the enamel of the cavity. Inlays necessitate the preparation of a cavity without much under-cut, or none whatever; and I think in that point very largely lies the result of the preservation of that class of teeth. I thank you, Mr. President and gentlemen.

DR. W. H. CUDWORTH: Then, if that is so, all credit is due to the porcelain inlay for teaching the American dentist to prepare his cavities without under-cuts.

DR. E. C. FRENCH: I want to ask one or two questions of these porcelain inlay workers, and then discuss the relative strength of the different bodies that are used. Are not the bodies that are being used, very similar to the bodies that are used in our porcelain teeth, or are they absolutely different?

DR. W. H. CUDWORTH: Absolutely different.

DR. E. C. FRENCH: I understand Dr. Peck, of Minneapolis, who is entitled to considerable credit in porcelain work, has used the bodies of porcelain teeth, and I would like to ask if that is not so?

DR. W. H. CUDWORTH: Yes.

DR. E. C. FRENCH: Has anyone ever made the experiment as to the relative strength between Closes, or Brewsters, and the different manufacturers' teeth?

DR. W. H. CUDWORTH: Yes.

DR. E. C. FRENCH: Which is the stronger?

DR. W. H. CUDWORTH: The body used in porcelain inlays gives greater resistance to stress than the porcelain in artificial teeth.

DR. E. C. FRENCH: At what point of the high fusing material do you want to stop to obtain the greatest strength of that body? We know that in porcelain teeth a tooth that is baked very hard, what we call a "hard tooth," will not stand the amount of force, and the patient is more liable to break it in use than one that is not so hard, and all tooth makers now, or a great many of them, are making a point of the fact that you can take their teeth and grind off the enamel and then repolish it up and get the same surface. They say the reason of that is that the body of the whole tooth is so dense that it will admit of that polish.

DR. W. H. CUDWORTH: The reason it is so dense is that it is the same material all the way through. The foundation of the

American tooth is the fused biscuited body. That is carved and covered with the lower fused enamels that are used in producing the enamel of the tooth.

I want to say right here that Dr. Peck's method of inlay is ideal. The strength Dr. Peck obtains in using an artificial tooth in building up his inlay is simply from the fact that he incorporates the enamel with the body of the tooth. There is a formation of flux, which holds the body, or small portion of the biscuited tooth, in contact; binds it together. The enamel of the tooth binds the base of the tooth together.

DR. E. C. FRENCH: Is it the highest art in making these inlays to get a perfectly solid surface and to get the gloss on?

DR. W. H. CUDWORTH: It certainly is, getting the highest polished surface so that it will not retain secretions, that surface from those things which are most easily removed from, creating the greatest preservative surface.

DR. E. C. FRENCH: Now, as to the matter of looks—that is, the artistic side of it—isn't a body that you can make the nearest color possible to the enamel of the tooth the most artistic?

DR. W. H. CUDWORTH: Dr. Reeves has told you this year, and he has told you a year ago, that that was the fundamental principle in making porcelain inlays. That while we have all the other preservative qualities, and restoration of form, he has been able to reproduce a color which is superior to any put forward in this country or in any other. Now, that is where Dr. Peck falls down. He gives us the enamel and the biscuited portion of the tooth, and he cannot reproduce the color, and it takes him half a day to produce an ordinary sized inlay.

DR. E. C. FRENCH: I understand that can be done best with the high fusing bodies.

DR. W. H. CUDWORTH: Dr. Reeves says so. I claim that I can do the same thing with the low fusing body, by using the same system that he does. The matter of light reflection is overcome by the system Dr. Reeves has given to this profession. You have got to take off your hats to him forevermore, just for that one thing. That is the only thing that I claim he is superior to us in. You have got to keep your hat off now, for there are thou-

sands making good porcelain inlays every hour of the day and every day in the week, Sundays included.

DR. E. C. FRENCH: I have seen porcelain inlays that were just as distinguishable almost as a gold filling, simply for the reason that the glazed portion was so highly polished.

DR. W. H. CUDWORTH: That was simply because the man that put it in had not delicacy of discrimination in colors. I want to tell you one thing: When you come to the matching of teeth we all know there are many men right around here and among us that can take a porcelain facing and select from the manufacturer's samples a facing that gives a match to any tooth going. They have that delicacy of discrimination as to colors. But there are ninety-nine men out of a hundred that cannot do it.

DR. E. C. FRENCH: On that point I just want to illustrate what I have been trying to get at. I took an English tooth and got the nearest shade possible I could to the corresponding tooth. I tried all the teeth I had and couldn't get one that was perfect in color, and the only way I could match up was to grind the enamel off the whole surface of the tooth.

DR. W. H. CUDWORTH: It was not your fault that God put that color in the tooth, and that the other teeth antagonized it.

DR. E. C. FRENCH: I say it is absolutely impossible for you to match up with the natural teeth.

DR. W. H. CUDWORTH: There is one thing we claim superiority in over you fellows. We porcelain workers have the ability to take that facing and grind off the enamel, and put an enamel on there that will match.

DR. E. C. FRENCH: I have ground the enamel off of the six anterior teeth, and sometimes the bicuspids, and I have been surprised at the results I could get; I say we have too much enamel, too highly polished enamel, on our artificial teeth.

DR. G. V. I. BROWN, Milwaukee: I think my first visit to Milwaukee and first talk to this association was on the subject of inlays. I was invited to come here and read a paper on this subject. If I recollect rightly, that was something like ten years ago. I belong to the old-timers, the twenty-years-ago inlay men. I have watched, in those twenty years, not only the successes and

failures of my own inlays, but those of a great many other people all over the country; and I have listened to just such discussions as we have had today, year after year. I have heard many men, and good men, declare that things were thus and so, positively, and it has occurred to me that it would be just as well to emphasize the point made by Dr. Peck, because I have lived to see those same men later radically change their ideas, advocate diametrically opposite theories and use materials which they would have spurned to use at one time. In those old days we did not know very much about inlays. We made inlays with platinum matrices, using the high fusing bodies, of course. We ground the porcelain to fit the cavity, and filled out with gold. We made inlays of gold, and burnished them to fit the cavity, after the manner of the present day, and filled in with solder. We made gold inlays with gold plate made hollow, depending for adaptation on the material inside, the cement or gutta percha. We had a great variety of inlays, nearly every one of which had its special advocates.

Now, it seems to have narrowed itself down to this simple question of the burnishing of matrix of platinum or of gold, because notwithstanding all that has been said here today, and with due credit to the gentlemen who have made the statements, I think it is largely a matter of tweedle-dee and tweedle-dum. The actual difference in the density of the small piece of porcelain that makes up an inlay of a few milimeters is a very small matter. I satisfied myself a good many years ago that I could not burnish platinum and make a perfect matrix. Wherever you find one of the old-timers you will find that he feels just about that way; the question is whether the men who use gold for a matrix are doing the work more perfectly than we did before. If they can make matrices of gold burnish, and adapt them perfectly, remove from the cavity without alteration, and then fill with any porcelain material that is strong enough to stand the stress, they have the most perfect possible inlay; but, gentlemen, you are obliged to depend upon cement, and no man who makes a cement or advocates one, will dare claim that cement is perfect; no man will dare claim that it is impervious, under all circumstances, to the secretions of the mouth. No man will dare claim that it will not be destroyed by acids, which we know are in

great quantity in the mouth. Now, just in proportion as we are obliged to depend upon cements, in like degree is the question of inlay work uncertain. I will even grant you that cement crystallized under pressure—which, by the way, seems to be yet unproven—is better cement than cement under other conditions. I am inclined to think it is so; but we have no scientific evidence, such as we should have, to warrant bringing these statements before this association. I find myself ready to commend everything that has been done. I have listened to this discussion and am glad this work has progressed to such a degree of perfection, but I find that I must make a protest against what I believe to be an erroneous comparison. I do it, with all due courtesy to the essayist, because I know his inlays do stand, are quite perfect, and all right; but I object to the comparison he makes between the relation of a cavity in a tooth enamel and dentine, and a surface of porcelain, another hard substance, and the example given, a piece of furniture, made of wood and joined. It may be that your wood holds well with a very little glue, but what man would undertake to make steel furniture and hold the pieces together with glue? Everyone will grant that you can grind two steel surfaces more perfectly than you can wooden surfaces. And I want to object to likening the two pieces of glass, where you have moisture and atmospheric pressure, with the porcelain, which is placed in the cavity of the tooth, from which the matrix has been removed. Whatever thickness it had—there must have been some thickness—and where we only have between those surfaces cement, which we know to be imperfect; where the entire surface is only one or two milimeters across, comparing that with two surfaces of glass, with the atmospheric pressure to hold them together and likening atmospheric pressure to the square inch to the pressure of the jaw with its full force, which, we know, under some circumstances, is very nearly 300 pounds; many times in ordinary mastication it is thirty or forty or sixty pounds at least. The comparison is out of proportion. It carries with it a wrong idea.

In saying what I do, I do it that no wrong impression may go out; not that Dr. Reeves doesn't understand the matter. I know he does. But when we speak in a meeting of this kind we do not speak for specialists like Dr. Cudworth and Dr. Reeves, but we

do speak to the average man, who comes from here, there, and everywhere in the State, and expects to go to his office and do this work and whose patients will suffer as ours have suffered in the years that have past.

DR. B. G. MAERCKLEIN: Mr. President, I want to speak for a moment on this subject, and at this time I want to illustrate the possible difference of our ideas and opinions. I am again in an odd position, very much like the Methodist minister who said it was necessary to have a diffeernce of opinion. Now, he said, for instance, "If everybody had been of my opinion, everybody would have wished to have married my wife." "Yes," said one old deacon, "if they had all have been of my idea she would have been an old maid." This shows there is a necessity for a difference of opinion, and we all have a different way of looking at things. I would like to ask Dr. Cudworth if he pronounced those two inlays in the central incisors exhibited here this morning opaque or translucent.

DR. W. H. CUDWORTH: I would pronounce those inlays, in some lights, translucent; in others, opaque.

DR. B. G. MAERCKLEIN: I looked at them from a dozen different lights, and I pronounced them opaque.

DR. W. H. CUDWORTH: Gentlemen, as far as that question is concerned, with reference to translucent inlays, we still have some things to contend with. Some day we will have materials that will overcome them. We have to take into consideration the cement that we have today, which is absolutely an opaque substance. Our porcelain, as it stands out of the mouth, those same fillings that Dr. Maercklein called attention to today, if they were placed in the teeth without the cement, would be absolutely translucent. When we put that oxyphosphate of zinc back of them we spoil our inlay. It is only in certain lights that we can have the beautiful effect of a porcelain inlay. Now, some man—and I hope that man is going to be myself—is going to produce an absolutely perfect cement. When it is proved this can be done, I want to tell you that any piece of porcelain put into the natural tooth will be translucent. There is one thing Dr. Brown touched upon in regard to cement. He didn't want it to be emphasized to the young men,

who could do this sort of thing and attain the same results that other men do. Now, with the same persistent patience that the older men have employed he will accomplish the same results that we have. As to the matter of cement, I claim this for a cement (Dr. Brown differs with me; a great many men differ with me), and that is as to the dissolution of cement. I claim that cement under inlay does not dissolve. I know it is a fact, not from any scientific point of view, but from the practical point of view. The longer the inlay is in the tooth the harder the oxyphosphate of zinc becomes. The dissolution of a cement filling is in comparison to the dissolution of cement that is used for the retention of a porcelain inlay. The dissolution of a cement filling, as I believe, is more mechanical than it is by the fluids of the mouth dissolving it out. I base my conclusions on this theory, that where we put a cement filling into the mouth we find it washes out, but at the enamel margin we find our cement, under a porcelain inlay, will wash or wear away until it has gone a trifle below the margin of your inlay and your enamel. Farther than that it cannot go, because the exposure of mechanical influences are so small that they have no action. In substantiation of my statement I will say that Dr. C. N. Thompson, over at La Crosse two or three years ago, brought us a tooth that he had cut off for the purpose of crowning the root. The statement he made was this, that he had put in, six years previous to that, a porcelain inlay. The young lady he did the work for at that time was about 11 years old, and did not want a crown put on. Six years later the same patient came to him with a large decayed surface on the other side of the tooth, and he did then cut it off, but he cut it off so that the porcelain inlay and the tooth itself was intact. He separated that filling before us there at La Crosse, and I give you my word of honor after six years you could hardly define the line of wear from the surface of the enamel and the porcelain, and there had been no appreciable dissolution of the cement.

DR. A. HOLBROOK: Before you close, and before you call upon Dr. Reeves for his final remarks, I wish to say, lest the majority of us may go home and take out all gold fillings, that I have not been doing porcelain work very much myself, but have got someone

to do it for me. I had a patient a short time ago who wanted a porcelain inlay. I did not feel competent to undertake this porcelain work, and as she was going abroad, she went to Dresden to our friend there. The work was done and it was paid for in good shape. When she came back she said: "Doctor, I wish you would take that out and put in the old gold filling again." That may illustrate, my friends, this case exactly. We all think we can go home and take out all the gold fillings and put in porcelain fillings that are perfect and exact, but before Dr. Reeves closes I want to warn you that we are not all Reeves or Cudworths. We may send them across the water and send them to the "great mogul," and they sometimes come back and want the porcelain work taken out and the old gold work put in.

DR. W. H. CUDWORTH: I had a case of that kind, where I put in a porcelain filling, and the patient came back and wanted a gold filling put in, because, as she said, she thought it didn't show enough for the money.

DR. W. T. REEVES: There was quite a good deal, as the different remarks were being made, that I would have liked to reply to. My forte is not talking. I cannot think of something ahead and keep it in mind; and I find that the few notes I made here were not full enough. But there is one thing Dr. Cudworth spoke about, that the high fusing men claim they could bake in a baking in the matrix, and then return to the tooth and burnish. Now, that is about as poor a practice as anybody can do. I claim that they can finish the burnishing of their matrix—and I think I can demonstrate to you tomorrow that a platinum matrix can be burnished to as close an adaptation as gold—and there is no further occasion to go to the tooth for the purpose of finishing the adaptation.

Now, there is another feature in connection with the necessity of grinding an inlay in order to make it parallel to the plane of the tooth. That is detrimental. You cannot do that without some possibility of grinding the enamel right at the margin; and I think all grinding that is done should be done before the matrix is removed, and then glazed in the furnace, so as to have the glaze of the porcelain set.

We are all of us more or less at sea as to what is the reason that there is no recurrence of decay, or practically none, around porcelain inlays. It is a clinical fact, and it will stand; it does not make any difference what any theorist says about it, or anybody else. It is a fact that there is very seldom any recurrence of decay around a porcelain filling.

Now, there is one difficulty that I apprehend in connection with the gold matrix, and that is the necessity of investing it. I think the investments are liable to shrink under the heat, and you stand a chance of changing the form of that matrix. Then again, you cannot handle a piece while building, shaping, carving, and so forth as well as you can without investment. Platinum of .001th thickness will give you rigidity of matrix sufficient that you are in no danger of disturbing the margins at all. You grasp that platinum at some point that is far enough removed from the margins with a pair of pliers, so whatever you do your platinum bends at your pliers and there is no changing, in any degree whatever, the form of your matrix.

There was something that Dr. Peck said that I wanted to speak about. I cannot call it to mind from the note I made here; I did not make the note full enough. The question was asked at what point the high fusing material was most desirable. There has been a good deal of experimenting going on in that line in the past few years as to the quality at which we can get the best results for use in the dentist's hands. It is between the point of two thousand and fifty and twenty-seven hundred and fifty to twenty-eight hundred degrees of the high fusing bodies. Now, those bodies that are used in the manufacture of teeth are at a higher point. Teeth are not put through and baked more than twice at the outside, and you take that same material and put it through the furnace three or four or five times and disintegration will take place. It will take place in the Close bodies. Now, at the point I have mentioned there it is found that the porcelain gives the best results.

There is one feature in connection with the use of porcelain that I apply to crowns and bridges, as well as inlays, and that is in the use of a body at about the highest point of the high fusing bodies, and make the crown or bridge work, and complete the work with

the body at a little lower. On the same principle that you solder up work and begin with the high caret and finish with that that is lower.

Dr. Brown spoke of the retention of inlays and the cement. Dr. Cudworth has practically said the same as I would say—that I do not believe that the question of the disintegration of the cement, or washing out of the cement, enters into the question at all. I do not think any inlay should be set in a cavity where there is margin at any point that admits of any chance of washing out, or admits the possibility of introducing the finest explorer you have into your cavity. Dr. Brown spoke of the fact that platinum must take up some room. He lost sight of the fact that your inlay is made in a matrix, and when the matrix is stripped off the inlay sets perfectly in the cavity. That is the reason that I have arrived at the conclusion that the strength of the retention is dependent upon the Close adaptation.

Dr. G. V. I. Brown: How do you know that the matrix does not take up any room?

Dr. W. T. Reeves: I can demonstrate that to you at any time.

Dr. V. G. I. Brown: You must have some means of detecting it.

Dr. W. T. Reeves: All I know is that the diagrams prove it to you.

In speaking of objecting to my illustration of the Close adaptation, likening the two things, the glass and atmospheric pressure: If the close adaptation was not the means, by the introduction of some substance, you would not have then any strength of retention. If the glass were in any wise separated, you would have no strength. The amount of water in there would not complete close adaptation. And, using the illustration of boards joined together, and the steel, the tooth and the inlay are more closely like boards than they are in any respect like steel. I am not prepared to say that certain classes of metal could not be held in close adaptation and joined with the proper medium of completing that joint that would remain solid.

I do not call to mind anything further now. [Applause.]

(TO BE CONTINUED)

BACTERIOLOGY AND PATHOLOGY.

BY GEO. W. COOK, B. S., D. D. S., CHICAGO, ILL.

(CONTINUED FROM PAGE 317)

In our discussion of tuberculosis and its various manifestations we discussed at some length the pleomorphism of this micro-organism, "the question as to whether any given specie of bacteria assumes only one form of growth or has the power of appearing in various shapes" is of great interest to the mycologist. And especially is this true where the interest of mycology centers around a pathological process, whether it be a medico-pathological mycology of animals, and especially of human beings, or whether it be of phyto-pathological mycology "parasitic disease of plants."

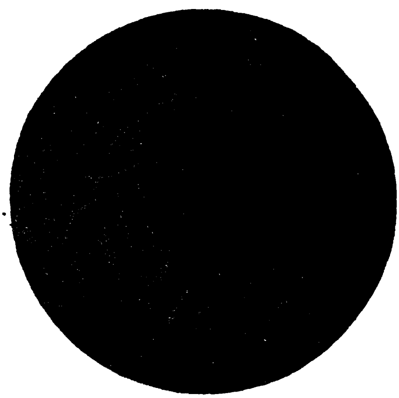
When the possibilities of pure culture was at first established it was believed that the uniformity of growth "mono-morphism" was practically constant, but the investigation of the question has preceded with energy and results have shown that the theory of uniformity of growth is practically untenable for bacteria, and is fast giving away to the theory of multiformity or pleomorphism. We do not wish it to be understood here that this capacity of changing form is possessed in equal degree by all bacteria and even a few appear to be almost constant in morphological appearance.

We have previously alluded to the external condition as the cause of variability in morphological appearance. Among the morphological forces that is most available we have previously spoken of the true powerful ones, the influence of temperature and the chemical composition of the nutrient media. It was at first thought that the change in cultural constituents sufficient to bring about the morphological change did not necessarily change the vitality and reproductive power of the micro-organism; this is, however, no longer the case, for it has been found in the modification of form which results in the exhaustion of a nutrient media, and consequently enriching it with injurious metabolic products. They take on a degenerative form and frequently exhibit the most surprising shapes, as will be seen by some cuts as presented that fairly illustrates this wonderful variation that takes place under the varied chemical con-

stituents of culture media, all of which has a powerful bearing on the biological phenomena of disease that we are here about to describe:

DIPHTHERIA.

Diphtheria is probably one of the oldest diseases known to the human race; for Bretonneau has shown that Homer and Hippocrates described this phenomena as observed by them as Malum Egyptiacum. It was at that time looked upon as a disease much to be dreaded. Aretaeus gave a very characteristic description of this



48 HOURS GROWTH ON BLOOD SERUM NON PATHOGENIC

disease (at the latter part of the first century and the beginning of the second century after Christ) in which he especially emphasized the fact that the tonsils were covered with "quodam concreto humore albo," which spread over the tongue and gums He at that early time gave a very good description of the difference of the malignant form and called attention to the difference in the pathological appearance of that form that run a mild and uneventful course to recovery, to that deep putrid or blackish clots, which in most all cases prove fatal. It was at this time that a combination of sulphate of copper with honey was recommended, a remedy which retained its position in the Pharmacopoeia for centuries, under the name of Unguentum Egyptiacum. This disease originated, according to the last named author, in Egypt and Syria, and especially in Coele Syria, whence it

derived its name Egyptian and Syrian ulceration. Microbius described a similar epidemic in Rome 380 A. D.

Forest wrote an account of the epidemic appearance in Holland in 1557, then it made its appearance in the seventeenth and eighteenth centuries in Europe. Short historical accounts appeared in different countries. The first truly accurate account given of this disease seems to have been by Bretonneau, which was in the form of two treatises, before the French Acadmy of Medicine in 1821; it was then that it received its name Angina diphtheritis. The name was given on account of its essential characteristic, the exudation. This

48 HOURS GROWTH ON BLOOD SERUM

author at that time insisted that diphtheria was a local disease, but he later came to the conclusion that a form of blood-poisoning took place, which gave rise to the constitutional symptoms. At about this period and after considerable discussion went on as to whether or not diphtheria and croup were not one and the same disease. Virchow held that diphtheria and croup were entirely heterogeneous processes.

It will be impossible to go into the discussion of the various views held by different writers upon the subject of the etiology and pathology of diphtheria. It seems that Ziemssen and Hueter as early as in the '70s discussed the bacteriological phase of this subject for the first time. Up till that time no definite etiological factor had been established following the announcements of these two authors,

that the diphtheritic membrane, the subjacent diseased part and even the blood contained in great numbers a micro-organism, to which they gave the name micrococci.

Nassiloff first demonstrated that diphtheria was transmissible to the lower animals, by inoculating a portion of the diphtheritic exudate in the trachea and cornea of animals. Recklinghausen, Waldeyer, Klebs, Eberth, Heiberg and others early came to the conclusion that the exciting cause of diphtheria was of a vegetable parasitic nature; and it was not until '83 and '84 that the true specific micro-organism of this disease was fully established. Klebs, in 1883, de-

24 HOURS GROWTH ON BLOOD SERUM PATHOGENIC

scribed the diphtheritic bacillus in the false membrane, but he at that time made no artificial cultivation of it. In 1884, Loffler succeeded in cultivating this micro-organism on artificial media and established its true identity as the exciting factor in diphtheria, by producing a false membrane on damaged mucous surfaces; but as he found the same organism in the throat of a healthy child and did not find it in all cases of diphtheria examined, he did not state definitely as to whether it was the true cause of this pathological process or not, and he also failed to establish the paralytic phenomena in lower animals, which is such a characteristic symptom in the human subject. Its true etiological relation to the pathological phenomena was not permanently established until the excellent research work done by Roux and Yersin. They at that time followed out the life history of the micro-organism and demonstrated that most of the characteristic

disease symptoms could be produced by the toxines that had been entirely freed from the organisms.

The pathological appearance of this disease on the mucous membrane presents a number of phenomena by which a clinical diagnosis is fought with many difficulties. In some instances the affected part may present only a slight redness, which entirely disappears after death, while in another instance it may appear as a catarrhal inflammatory process. The third form is the one that presents all of the clinical appearance of the disease, which is the infiltration of the mucous membrane with a fibrous exudate, intermingled with

FROM SMEAR VERIFIED BY CULTURE

pus and epitheloid cells, also blood cells, in which there are suspended a granular material and also the various bacterial forms which is the exciting factor; this is usually spread over the entire affected surface.

This membranous exudate usually undergoes a process which is designated as coagulation necrosis. With the necrotic changes that takes place in this exudate the deep and superficial cells of the mucous membrane undergo a necrotic change. The inflammatory products and the necrosis that takes place has a wide range of variation in different cases. This membranous exudate may exfoliate with or without loss of the underlying tissue-cells. Some of the local complications that follow may be small abscesses and œdema, the lymph nodes are liable to be swollen, and a microscopical examination may

reveal a hyperplasia of the endothelial cells, with small necrosis and foci degeneration.

A fatty degeneration may be found in the liver, spleen and kidneys. One in not frequent complications is an albuminous degeneration of the kidney "acute nethritis." It is not an uncommon occurrence that a form of degeneration of the heart muscles may take place in many of the very malignant forms. It also frequently happens that small hemorrhagic foci may be found in the liver and kidney.

There is a form of paralysis accompanying diphtheria which dem-

12 DAYS GROWTH ON SALIVA CONTAING ½ PER CENT OF GLUCOSE STARTING WITH 25 cc ADDING 10 EACH DAY

onstrates pretty conclusively that a degeneration of the peripheral nerves, and a chromatolysis of the ganglion cells, which is caused beyond question, by the toxines absorbed from the local lesion.

Diphtheritic toxines seem to produce two distinctive varieties of paralysis, a local and a general one. The local manifestation is observed in the soft palate, nose, larynx and eyes. The general paralytic phenomena usually commences in the lower limbs and may affect the whole body. It is reasonable to presume that the local paralysis is due primarily to a peripheral neuritis. The general paralytic manifestations are most likely due to the primary myeleties with secondary neuritis. Three cases that died of diphtheritic paralysis were examined by Katz, and in all cases he found a necrotic process in the anterior cornual cells. There was also observed a fatty

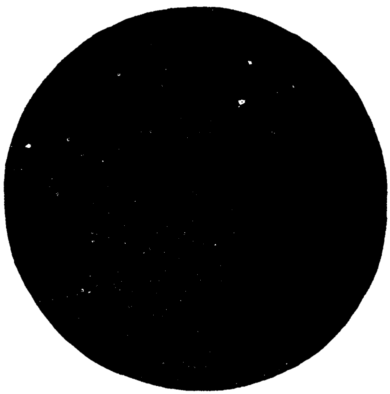
degeneration going on. It was also noted that in the peripheral nerve destruction that the axis cylinder was undergoing a degenerative change; this was especially true when the phrenic nerve was involved. The examination of the spinal cord of guinea-pigs, which died in from one to three weeks after inoculating the animal with cultures of diphtheria, was found that the anterior cornual cells were more or less affected, and the nerve fibers also showed a degeneration.

It has been reasonably demonstrated that the quantity of toxine injected plays somewhat an important part. It has also been shown where toxine and antitoxine were administered together these degenerative changes took place only where the toxines were in excess. Thomas, in 1898, concluded after the examination of twenty-five fatal cases that one of the ordinary conditions was a marked parenchymatous degeneration of the peripheral nerves, frequently associated with hyperemia, hemorrhage and interstitial changes. There is also a degenerative change present in the heart muscle. It is not at all uncommon to observe a hypermia infiltrate and hemorrhage in the brain and spinal cord, but it is a question if these conditions are severe enough as to cause a permanent effect. There is one point that has been pretty thoroughly demonstrated in those cases of sudden death. In the course of convalescency or even when the disease is at its height, death is caused by the action of the toxines on the nervous apparatus of the heart.

There are a great number of constitutional symptoms that may be of clinical advantage from a diagnostic standpoint, but we cannot go into detail here, neither is it necessary to enter into a great lengthy description.

Dr. John C. Cook, in a recent paper before the Chicago Pediatric Society, called special attention to the loss of reflex in the lower limbs. He laid considerable stress upon this peraphlegic condition as a means of diagnosis, but some authorities claim that a diagnosis made by clinical signs and symptoms is not at all a reliable one. So it has been considered necessary in order that anything like a scientific diagnosis can only be arrived at through a bacteriological examination, which is by no means easily accomplished in a great number of cases, owing to the great variability of morphology and staining characteristics.

In making a bacteriological examination there are a number of facts to be taken into consideration, the size and the thickness to the length of the micro-organism, also the staining reaction and the arrangement of the bacilli to each other. Research has forced us to almost conclude that there are a number of variety of the diphtheria bacillus. Since 1887, when Loffler called attention to the pseudo-diphtheria bacilli there has been a great deal of discussion and no little amount of confusion in a bacteriological diagnosis. There seems to be a form of diphtheria bacilli which is more or less virulent, and at the same time does not adhere very closely to the type

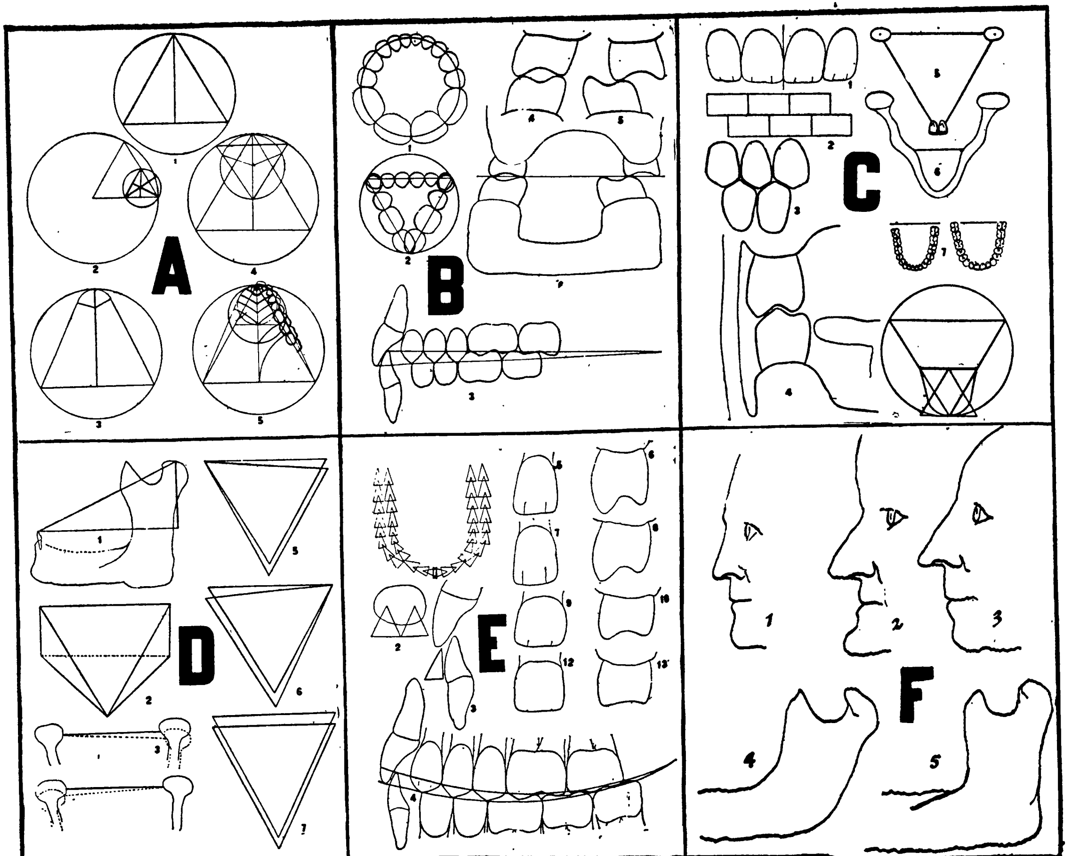


15 DAYS GROWTH WITH AGAR AGAR BOUILON CONTAING ½ PER CENT OF GLUCOSE STARTING WITH 50 cc ADDING 10 EACH DAY

upon which the microscopical diagnosis is made. This necessarily brings up the question as to the length of the time patients should be quarantined, for in the examination of Westbrook and Wilson they have found the diphtheritic bacillus in the oral and nasal cavities of children for several months after the disease had completely disappeared. They also found them on the mucous membrane of individuals who had never suffered with the disease. This has been the experience of a number of persons who have cultivated the micro-organism at all from the mouth, and especially from children. I have examined the nose and throat of more than a hundred children and found the diphtheritic bacillus in the mouths and throat of individuals who had never suffered from the disease previously or after the examination so far as I was able to ascertain.

The cuts accompanying this article show some of the varieties of form that are frequently met with in bacteriological examination of the oral and nasal mucous surfaces. In Westbrook and Wilson's article they have shown a greater variety of forms than I was able to obtain in my investigations of this subject. From the cut exhibited here marked as smear by Zeit; this seems to be the most constant form in the severe type of the disease.

A smear made directly from the throat when the individual is suffering with this disease is what is known as the direct method of bacteriological examination; but this should be followed up by cultures made directly from the throat. In a great many instances when you have secured a culture from the throat you may find considerable change in the morphology of the germ after it has been cultivated. And especially is this true after twenty-four hours' growth on blood serum. Zeit has prepared blood serum from a dog on which the diphtheritic bacilli grows very much larger than when grown on serum from cows and sheep. My experience in growing the micro-organisms and especially those that become easily adapted to grow on mucous surfaces change their form a great deal more than those whose natural habitat render them so that they do not grow easily on mucous surfaces. When we consider that micro-organism growing on mucous membrane has a new solution added to it every few moments, and that solution is influenced by nervous strain, excitation of all kinds, we are not at all surprised that a variability of form and their physiological activities are very different when they are grown in the media that is fixed chemically and only used 10 c.c. or thereabouts, which is the ordinary amount prescribed for each cultivation. I began to cultivate the diphtheritic germ and a number of others that are frequently found in the oral cavity, by taking petri-dishes from six to ten inches in diameter and would place in the ten-inch dish 50 c.c. of the culture media to be used, and to that added 10 c.c. each day. The form as shown in one of the cuts fifteen days' growth on agar-agar bouillon containing one-half of 1 per cent. of glucose. I started with 50 c.c. and added 10 c.c. each day for fifteen days and obtained that growth from the growth marked 24 hours on blood serum pathogenic. This is a pretty good illustration of what can be accomplished many times in changing the forms of these micro-organisms. It also illustrates that it is not always prac-


A
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ticable to make a bacteriological diagnosis with any great degree of readiness.

Quoting from a discussion from mine, before the Chicago Pediatric Society, I said that one of the interesting features from a biological standpoint would be to render the pathogenic bacilli to a non-pathogenic state and back again to its pathogenic form. This has never been done so far as I know with any great degree of satisfaction. Roux and Yersin have found that the pseudo forms may be increased in virulency by being grown on a suitable media. In one instance I was able by growing a non-pathogenic form in bouillon, containing about 3 per cent. of asperagine and a half of 1 per cent. of glucose I rendered the germ pathogenic, and on filtering the bacteria out of the solution I was able to produce death in rabbits and guinea-pigs; but in this case I added new culture media to my growth for several days before testing the virulent properties of the germ or its products.

MANDUCATION AND MASTICATION: HOW PERFORMED.

BY B. J. CIGRAND, M. S., D. D. S.

Read before the First District Dental Society of Illinois at Rock Island, September 23, 1902.

In the winter of 1900, while a guest at the Odontological Society of Chicago, I took occasion to say, while discussing the underlying principles of mastication, that our knowledge of the precise movements of the jaw was not sufficiently clear to declare that we understood how manducation and mastication was really conducted. My remarks along this line seemed to strike a chord, and the result was that I was requested to embody my deductions into a paper for the Illinois State Dental Society. My Rockford paper delineated the character of my observations as founded on the theories of nature. Your committee has asked that I elucidate the points in that paper and add such items as have occurred complemental to the theme. Of course we owe the inceptive thought of perfect artificial mastication to Dr. Bonwill, of Philadelphia, though he was much in error as regards many of the masticatory principles;

still in a number of important points he was correct, and he deserves much credit for having directed our attention to the careless and non-anatomical manner in which the artificial dentures were being constructed. Notwithstanding the fact that close obervation demonstrates that he was in error on the crucial points, we must remember him as the great advocate of normal mastication.

The subject of mastication is one which is of considerable interest to both the operative and prosthetic dentist, since success in either primal departments can only be assured after we have a full understanding of the process of eating and philosophy of mastication.

There can be little doubt as regards the inefficiency of the artificial denture which admits of only ginglymoid movement, since this mere hinge movement is not in accord with nature. Disregard for normal or perfect mastication has led the practitioners to grow indifferent to nature's substitute, and the result is that the public pays the penalty of violation of nature's laws.

Many practitioners offer as an argument that the patients do not appreciate the true worth of teeth constructed, allowing accurate jaw movements; besides the same dentists claim the time devoted to so laborious a task is not sufficiently compensated. To the first objection I would say, if the dentist will instruct his patients in the science of normal mastication, incidentally pointing out the value of lateral movement, the patient will anxiously accept his judgment as deserving recognition; and as regards the subject of price, I can say that $1,000,000 has been offered for a perfect, comfortable, and useful artificial denture. The New York millionaire who offered this fabulous sum fully appreciates the value of proper masticulation, and he has placed upon the prosthetic department additional glory, since no other branch of our art and science has received so high consideration.

If we make nature our only model and studiously seek to copy after the divine, we will progress and render the most humanitarian service. If true art consists in "hiding art," and true science means perfect harmony, then we have much to learn ere our varieties of substitution approach the pattern furnished by the Creator. We must set up fewer clandestine models and patterns, for after all the

most aesthetic and invariably the most useful is indexed in the Book of Providence.

The diagrams which I present to you are carefully prepared copies from nature, and I invite all present to criticise the paper as I am eager to learn more about this fascinating subject, and by this means be the better prepared to render services to my patrons.

Diagrams A. and B. These are accurate reproductions of Dr. Bonwill's theories, and I present them so you will more thoroughly understand wherein my deductions differ from his.

Diagram C. The individual tooth, as nature supplies it, is free from immediate support; the neighboring teeth approximate but are in no sense attached. They lend one another strength in that they are positioned in a geometric figure, having the elements of a triangle, circle, and square; and this allows that the contact point of each tooth shall touch its neighbor. The teeth are so arranged in this figure that a strain which falls on any one of them of either half of the superior or inferior dental arch, is communicated to the several teeth on that side of the jaw, thus distributing the strain. Hence each tooth is as independent of its neighbor in its functional character as though the masticating apparatus consisted of but a single superior and two inferior teeth, or vice versa, as Fig. 1 shows. This disposition of the teeth is well illustrated in architecture in the building of brick walls, and is known as "bricking the joints." Fig. 2. In the mouth this arrangement serves the dual purpose of permanently establishing the position of each tooth and assisting most decidedly in breaking food of a brittle character. Fig. 3 represents clearly the inferior half of the mouth, known as the lingual cavity, showing how the tongue hugs the surface of the teeth and how the lips and cheeks fold about the opposite surfaces. A wise arrangement in nature admits that mastication can be vigorously prosecuted without molestation of the tongue or cheeks. This happy result is attained in that the inferior teeth extend to the center of the dental figure, while the superior teeth extend to the circumference, as shown in Fig. 4. In conjunction with this idea I believe artificial teeth should be fashioned as in Fig. 4. The teeth should be ground to yield occlusal surfaces and so shaped that the superior accurately complement the inferior teeth. If constructed as diagramed they will glide over

each other more readily, facilitating mastication and assisting in retaining the dental bases. I cannot agree with the theory of Dr. Bonwill in his dental forms, as indicated in Figs. 4, 5 and 6 of Diagram B. He has the lingual cusps of the inferior teeth too high, and they pitch too decidedly outward above and inward below. Such a condition will tend to dislodge the superior base. But when the teeth are as Diagram C, Figs. 3 and 4, they allow the tongue to direct and deliver the food on the lingual cusps of the inferior teeth, while the cheeks coax the food up against the buccal cusps of the superior ones. And in this battle of forces between the tongue and cheeks mastication is normally accomplished.

Figs. 5, 6, and 7 accurately represent the figure which the teeth form in both the superior and inferior maxillary bones. I labored diligently to portray the two jaws in harmony with nature, and have brought innumerable models, casts, and skulls to aid in demonstrating that the drawings are perfect. Upon this diagram I base my theorem of trigonometry, relative to the disposition of the teeth in prosthodontia, and of which I will speak later. Fig. 7 indicates the superior maxillary bone and Fig. 6 the inferior, while Fig. 5 gives us a shadow view. The triangularity of the lower jaw immediately appeals to us; hence, if a line is drawn from the center of the right condyle to the same point on the left, and then two lines from these points that will meet at the septum of the inferior incisors, there will have been described a perfect equilateral triangle. Fig. 5. The length of these lines will be somewhat more than four inches. You will observe that the human jaws are not so pointed as indicated by both the drawings and theorems of Dr. Bonwill. They are not so short and sharp as he represented them in Diagram A, Fig. 5. And if he portrayed the shapes of the jaws contrary to nature, he also applied the wrong theorem and could not hope to attain the normal philosophy of these jaws. I am satisfied that he was in error in his geometric deductions, and although he was a close student of this subject, I fear he failed to select the composite jaw, and in consequence did not complement the right geometric figure. Fig. 8. In this I have designed the theorem which meets the requirements of the proposition under consideration. In the first place, we use a circle to facilitate getting a perfect equilateral triangle; since geometry teaches us that a perfect equilateral

triangle is produced by joining three lines of equal length within a circle. I next observed that in the anterior portion or half of the triangle the teeth were located; that the base of this sub-triangle marked the position of the molar teeth. Geometry teaches further that when two equilateral triangles are brought in apposition with their cones their bases form the outer surfaces of a square, the center of which describes the arc of a circle. Where the circle meets with the straight line is registered the first inferior bicuspid. It has been taught in the past that the cuspids were the prominent teeth which marked the point where the circle verged into a line, and consequently we have been at a loss to ascertain the geometric figure and proposition. This would answer our purpose. The first bicuspids in the inferior maxilla are the guiding points, and their importance must not be underestimated, as I will shortly demonstrate. The solution of this problem did not occur to me until I had given the subject something like five years of study, and many a diagram I drew before I acquainted myself with this underlying principle.

Dr. Bonwill was working along the right lines, but accepted the wrong theorem, and consequently his jaw is too pointed and does not fulfill the requirements of nature. You will notice that this vexed query is simplified by my figure in that we dispense with the innumerable lines, circles, and fractional circumferences found in Dr. Bonwill's theorem, Diagram A, Figs. 1, 2, 3, 4, and 5. The question is not one of circles but of triangles, and the next few figures and diagrams will prove that triangles are the fundamentals.

Before leaving diagram C, you will notice that my figures have the teeth towards the observer, Dr. Bonwill's having the teeth from him. I placed them so because we are taught in dentistry and anatomy to study the human mouth from the median lines. Instead of viewing the jaws from the distal surface—through the patient's throat—we are looking at our subject as you would observe him in the chair. Fig. 2 gives a clear idea of the curve which is found when viewing the jaws from the lateral aspect. Dr. Bonwill taught us that the cusps were as long as the over-bite was deep, and that the cusps diminish in length as we go distally. This was indeed a great discovery, and I need not dwell on the importance of understanding the purpose of this curve and the nenecessity of knowing the value of Dr. Bonwill's deductions in their

relation, for all present must be familiar with this, the crowning glory of that great man's life. I might add that he represents this overbite as a triangle, Diagram B, Fig. 3, and I have drawn it to approximate nature and represent it as two curves approaching each other distally, Diagram E, Fig. 4.

Diagram D, Fig. 1, represents what I have chosen to call a lateral triangle, which is formed by a line from the condyle forward to the front teeth, then back over the plane of occlusion, and thence up to the center of the condyle; and the lowest point is the pivotal point of the jaws. When this imaginary triangle is coupled with the anterior triangle they describe Fig. 2. Another set of triangles is formed while the jaw is in process of mastication. When the lower jaw rotates to the left the right condyle moves forward and downward, while the left one simply turns on its axis. The reverse is true when the jaw is thrown in the opposite direction, and in consequence *imaginary triangles are formed corresponding to the depth of the glenoid fossa and the length of the cusps of the teeth.* Figs. 3 and 4. This assists in determining the overbite. When the jaw cannot be freely rotated it indicates a predisposition on the part of the patient to live the life of carnivora, meat-eating; while when the jaw can be readily thrown from right to left there is a disposition in the owner to be herbivorous, grain, and vegetable-eating. In the former I observe that the glenoid cavity is *deep* and in the latter *shallow.* The condyle moves forward and downward until obstructed in its further tendency by the eminentia articularis, and when the condyle moves beyond this point there is dislocation. Fig. 5 shows the inferior jaw thrown to the right, Fig. 6, moved to the left, and Fig. 7, thrown forward. The triangle being pinioned at either right or left side, and being a perfect unit, all points must swing in the arc of the circle in proportion as they are distant from the pinion center. If this be true—and I see no error in it—then the cusps in *normal* mastication must all describe small triangles, as Fig. 1, Diagram E, illustrates. Hence, everything seems to indicate that the philosophy of mastication is founded on triangles and not on circles. When we more thoroughly understand these principles we can produce prosthetic substitutes capable of rendering service. If we continue to construct our dentures in defiance of these underlying truths, we are not only yielding abortive results,

but are disgracing the divinity which enters into the work of our noble calling.

There is not today an articulator in the market which accurately copies the movements of the jaw. Although the Bonwill and Gritman approximate the motion, they fail to register it accurately at the most important points. In the preceding pages I have given you the anatomical outlines and principles of the jaws, and after years of consideration have constructed an articulator which I believe is an improvement over those now used. It is briefly this: It copies the jaw in its downward, forward, and upward movements; and its lateral movements as well, which is the prime consideration. I have also constructed an articulator for crown and bridge work which works on the principle of a ball and socket.

The Kerr articulator, fashioned according to my deductions, accurately mimics the jaw.

In Diagram E we observe the necessity of clearly understanding the temperaments of our patrons, since artificial teeth can yield the desired result only when the cusps and general construction of the case is in perfect harmony with the disposition of the patient. In Figs. 5 and 6 we have the central and bicuspid of the motive temperament. Figs. 7 and 8 indicate those of the mental temperament; Figs. 9 and 10 those of the sanguine temperament; while Figs. 12 and 13 illustrate those of the lymphatic temperament. The laterals and molars in both jaws would be complemental to those just described.

In Diagram F I have designated three varieties of faces which we are called upon to restore. The first, or Fig. 1, shows the straight face, Fig. 2 the crescent, or concave face, while Fig. 3 illustrates the round or convex face, and in the full knowledge of these three faces, together with two kinds of inferior maxillary bones, Figs. 4 and 5, rests our success as regards reproducing the edentulous mouth, a task pre-eminently difficult. We have as yet determined but little along these lines, and I dare say have only inaugurated a course of observation, though with the aid of careful notations, in the near future we may obtain scientific results. Until we devise some apparatus which will accurately register on the living subjects of the various temperaments, the movements of the jaws in manducation, articulation, and mastication, we cannot hope to

do justice to the prosthetic department. If I have added anything of value to those who have labored in this same field, or awakened others to appreciate the theme, I shall feel that my visit to your society has fulfilled its humble mission.

PROPHYLACTIC ITEMS.

BY R. B. TULLER, D. D. S.

(THE FIRST OF THESE ITEMS BEGAN IN JULY)

"Doctor, your diagnosis? What is my trouble?"
"A bad case of pyorrhœa alveolaris, madame."
"Pyorwhatis, Doctor? Can you cure it?"

How about it, Doctor? *Can* you cure it?

Of course, it can be cured. There is one sure way.

When everything else fails you can extract it with the forceps;

And you can feel assured and promise your patient that it won't recur.

If you have any other sure cure, "I'm from Missouri; please show me."

That is to say, I'm skeptical.

Of course, I'm talking about extremely bad cases.

I say you can extract and assure a cure.

But that is the last resort, of course.

There are a number of ways and means to bring about an improvement.

Yes, you can even bring about salvation in many bad cases.

Incipient cases yield with little trouble by a thorough removal of the calcareous deposits.

That is the prophylactic measure as regards a worse stage.

And that is the line we should work on—when we get a chance.

But there is a proviso in there if you want the case to get better instead of worse.

That is, to sterilize your instruments with great care.

Emphasize STERILIZE in Pyorrhœa cases with capital letters.

It is well to use sterilizing precautions all through the operation.

That is, to the extent of using some good antiseptic to frequently dip your instruments into.

PREVENTION of pyorrhœa alveolaris is the thing to lend our efforts to in all cases that come into our hands.

Provided patients will let us—and pay for it.

But after removing deposits and treating pockets, what else can we do in a prophylactic way?

Did you ever try the water wagon, Mr. Dentist?

Of course, *you* understand this refers to the drinking habit.

Inquire into the habits of your patients.

Yes, ladies and all.

Advise them to drink—

Water (nothing on the side).

Not one person in a hundred drinks enough water through the twenty-four hours.

They drink too much at meals and not enough between.

Advise four or five glasses of good, pure water in the forenoon.

And as many in the afternoon.

And one or two before retiring.

A glass of hot water on rising is good for the stomach.

Water, pure water, is Nature's remedy for many ills if properly taken.

Some people bathe in it—occasionally.

But what does water do for Pyorrhœa?

Well, not very much for Pyorrhœa, per se, except wash out pockets.

But it will flush the system, so to speak, and carry away through the natural channels a lot of calcic salts that are looking for a good place to lodge somewhere in the system.

And are especially partial to the necks of teeth.

This is an easy matter to test in your own system, if you have considerable deposit of tartar.

A faithful observance in your own case, or with patients following the advice, will show almost immediately a decrease in the quantity lodging on the lower front teeth, for instance.

And it will show a decrease as long as the habit is kept up.

Always provided, that the water is pure and reasonably free from calcic or lime salts, that would be precipitated under certain conditions in the system.

It is a healthful practice all around to drink plenty of good water, with nothing on the side. I KNOW it.

Some mineral waters are very excellent—the lithia waters especially.

But any good water will do if plenty is taken.

Be a habitual drinker—of water, and advise its use.

And there is another thing as free as—I was going to say air; it is air. ("No hot air".)

What does air do for pyorrhæa?

Well, if taken pure, and in large quantities, before meals, at meals, between meals, and after meals, and at night—without snoring—it helps keep the pyor-monster down.

Oh, I know your patients take it, now, regularly, or they wouldn't keep their appointments. (Oh, fudge!)

But they don't make the special effort to fill the lungs as full of it as they will hold *a hundred and one* times a day.

Do it yourself and advise a hundred and one times without fail.

And they can have as much more as they like.

That is, until the old man with the scythe gets after them.

Of course, he's liable to cut off the supply.

But he cuts off pyorrhœa at same time in one fell swoop.

Oh, yes, *he's* a sure cure, too.

But that air: What especial effect has it in a prophylactic way?

Why, it is another of Nature's remedies which goes to keep the system in a good working order.

Water and air properly used do more to keep the system in good order than anything else we take into it.

Isn't it strange?

And when the system is in good working order these deleterious things are going out through natural channels.

The benefit that people get who go to health springs is that they make a business of getting a lot of good water and good air, generally, into their systems.

Good air and good water taken as systematically and plentifully at home would often do just as much good.

Except possibly at home and about our usual avocations we would not get the rest and relaxation that our system requires, too, at times.

Now, if I could advise you how to insure patients following your advice, or mine, I'd make that my specialty—on a royalty.

But you can do your duty.

The duty of every dentist is to use all the prophylaxis he knows of.

And charge a fee for it, of course.

If I could insure your getting a fee for advising water and air I'd do it for 33 1-3 per cent.

But if you are a professional gentleman, do your duty if you don't make a cent. That hits many of us.

It is the real professional gentleman, the real professional attitude, that brings good professional fees.

It is the dub dentist who cleans teeth (shines 'em up) for 50 cents or $1—regardless of conditions—who wonders why he can't get more than $7 or $8 for a rubber plate.

I hate the nomenclature, "cleaning teeth."

It ought to be relegated to the coming shine parlors.

Or let people *clean* their own teeth.

When you remove calcareous deposits as it should be done you have done somthing more than shine 'em up, though they may shine like pearls for your effort.

When you remove calcareous deposits as it should be done using sterilizing precautions before and during the operations–and after–you do your patient an important prophylactic service, that deserves a *professional fee.*

And don't forget to tactfully impress that fact upon their minds.

It is up to you to impress your patients with the importance *of all* your work, Mr. Good Dentist, if that is what you are—the real thing.

I don't mean boastfully, for that is shallow.

I mean by giving dignified importance to all your operations and professional advice.

What has that to do with prophylactics?

Why, prophylactic means preventive.

Practice prophylactics and do good. Be professional.

But to *prevent* an empty purse charge a reasonable fee for your time, your knowledge, your skill and your professional advice.

AND THEN COLLECT IT.

ADENOIDS.

BY CASSIUS C. ROGERS, A. B., M. D., CHICAGO.

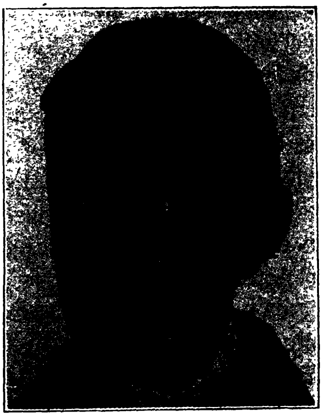
Respiration.—A study that has interested dentists for a few years, and which from a dental standpoint so far as I know is practically new and in its prime, is that of breathing. The organs of breathing are the nose, the pharynx, the larynx, the trachea, the bronchial tubes, the bronchioles, and the alveoli of the lungs. The air enters either through the nasal passage or the mouth, passing to the pharynx, and from there to the larynx. Normally a person should breathe with the mouth closed, the air going through the nasal passage into the pharynx; if for any reason, however, the nasal passage is occluded, nature has provided us with another organ through which we can breathe and get air into the lungs—the mouth. As air is essential for life, it is necessary for the blood to take up oxygen in the lungs, carry it to the capillaries throughout the system, and there free itself from the oxygen and take up carbonic acid gas and carry that to the lungs, where the carbonic acid gas is taken out of the blood and oxygen again taken up. If for any reason the oxygen cannot get to the blood by way of the respiratory tract, death occurs; if for any reason carbonic acid gas cannot be taken up by the blood and carried to the lungs and thrown off, a person succumbs. And a proper amount of air is absolutely necessary for the proper nourishment of the individual.

A person normally breathes about eighteen times a minute. Age, altitude, climate, habits, etc., influence the number of respirations a minute. A person may breathe twenty-two times a minute and still have normal respiration, or may breathe sixteen times a minute and have normal respiration.

The muscles of respiration are partially under the control of the will, consequently they are voluntary from that standpoint; how-

ever, a person cannot hold the breath until he is asphyxiated, therefore the muscles are not entirely voluntary. If a person holds the breath for a sufficient length of time he will finally become unconscious, when the muscles of respiration will relax, causing air to rush into the lungs, when the person is revived. Therefore, it is impossible for a person to hold the breath long enough to produce death.

The nose for convenience is divided into two parts—the right nostril and the left nostril. The partition between them is called the septum; the anterior part of the partition is cartilaginous, the



FACIAL ASPECT IN DEAFNESS ASSOCIATED WITH POST-NASAL GROWTHS.

posterior part osseous. For that reason the anterior part is pliable and easily bent, while the posterior part is very firm. If, for any reason, the septum is too long or the cartilaginous or osseous portion should have been fractured and not placed again in the proper position, we have one or other of the nares partially occluded, due to the septum being pressed abnormally to one side or the other. Sometimes congenitally the septum is too long, when it takes an arched form, it bends to one side or the other, very frequently to the right side, leaving a very large naris on the left side, in which case the individual has no trouble at all in getting a normal amount of air through the nasal passage; but the air is all passing through

one naris. The septum is smooth, covered with mucous membrane, and is richly supplied with blood-vessels and mucous glands.

The external boundary of the nasal passage is very different; it is bounded externally and above by the alae of the nose, by cartilage, and still higher by the nasal bones. On the sides if we look into the nasal passage we will find visible two prominences or ridges with a groove between and a depression or furrow below each one of them. These elevations are called the turbinates, and if in your dissecting you remove the mucous membrane and the tissues you will find the small, fine turbinated bones, somewhat flanged, and looking something like a plowshare. There are three turbinated bones. The superior one can very seldom be seen from examining the nares, consequently we will speak only of the other two—the middle turbinate and the inferior turbinate bodies. The inferior turbinate body lies lower than the middle and more anteriorly, and is very readily seen by placing the finger on the tip of the nose and pushing the end of the nose upward and backward, the other hand pressed upon the forehead, with the light from a well-lighted window or reflected light thrown upon the face of the patient, when you can see far back into the nares.

The Turbinate Bodies.—A very common cause of mouth-breathing is the enlargement of the inferior turbinate bone, so that the normal amount of air cannot pass through the nares. The corresponding turbinates on both sides may be enlarged, or only one; if only one turbinate is enlarged, for instance that on the left side, the other nostril may be large enough so that sufficient air can pass to enable the person to breathe normally through the nose. However, it is not normal breathing, because a normal amount of air should go through both sides of the nose.

The middle turbinate lies above the inferior turbinate and somewhat farther back, and is often very difficult to see. If for any reason it is hypertrophied, frequently it is very distinct. Simply the anterior end of it may be enlarged, in which case the condition is called hypertrophy of the anterior end of the middle turbinate. I cannot liken its appearance to anything more than to a strawberry that is just about half ripe—it is full of small indentations representing the seeds, the slight elevations representing the fleshy part of the berry; therefore a half-ripened strawberry looks as much

like the anterior end of the hypertrophied middle turbinate as anything I know of. The posterior end may be enlarged, in which case, if it is greatly enlarged, you will be able to look through the anterior nares and notice the enlargement; but if the anterior end of the middle turbinate is enlarged at the same time, it is impossible to see the enlargement of the posterior end without the aid of reflected light. In this case you may use the rhinoscope, which is a mirror similar to that used for examining cavities in teeth. Take the mirror and pass back of the uvula, and by reflecting the light from the mirror into the pharynx through the mouth you can see the middle turbinated bone and determine whether it is enlarged or not. The posterior end when hypertrophied looks very similar to the anterior end, also being likened to the half-ripened strawberry. There may be a great deal of hypertrophy, there may be a small amount of hypertrophy; and as to the extent of the disturbance there is no rule by which we can go. A small amount of hypertrophy in some individuals will sometimes cause as much trouble as a great deal of hypertrophy in other individuals, if not more.

The nasal passage is lined with mucous membrane, the upper part is lined by ciliated epithelium, and has its definite function.

The treatment for hypertrophy or deviation of the septum we will consider later.

Posterior Nasopharynx.—Lying posteriorly to the nares is what is called the posterior nasopharynx, and it is to this region that I wish to call your especial attention. It is a region in regard to which there is at present going on a great deal of investigation, both from a dental and medical standpoint. The pharynx is located behind the nose, the mouth and the larynx; the form of the pharynx is conical, the base being upward and the apex downward. It extends from the base of the skull to the cricoid cartilage in front and between the fifth and sixth cervical vertebræ behind, making the length about four and one-half inches. It is broadest in its transverse diameter, the anteroposterior diameter being the shorter. It is bounded above by the base of the sphenoid and basilar processes of the occipital bone. In your dissections you have probably noticed how cellular or honeycombed the sphenoid bone is, and if infection gets in a bone of that kind it is very difficult to treat and very difficult to eradicate the infective process. An opera-

tion for infection of the sphenoidal sinus is one of the most difficult operations that an oral surgeon has to contend with. If for any reason there is infection in the nasopharynx just below this, it stands to reason that the infection could travel upward very readily through the periosteum and infect this bone.

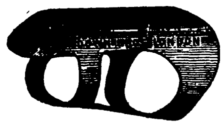
Posteriorly the pharynx is connected by loose areolar tissue to the longus colli and recti capitus antici muscles. Behind this is the vertebral column. Between the nasopharynx and the vertebral column we normally have simply mucous membrane and a slight amount of areolar tissue. Anteriorly it is incomplete; it is attached

POST-NASAL GROWTH AS SEEN BY POSTERIOR RHINOSCOPY.

in succession anteriorly to the internal pterygoid plate, pterygomaxillary ligament, the lower jaw, tongue, hyoid bone, and the thyroid and cricoid cartilages. Laterally it is attached to the styloid processes. It is in contact with the common and internal carotid arteries. This should always be in mind—that on either side of the nasopharynx, very close to it, are the common carotid and the internal carotid arteries. Therefore, in operating in this region, either with a cautery, knife, or curette, this must be kept in mind, because to cut the internal carotid artery or the common carotid artery from this region would undoubtedly mean death to the patient, unless the operator was skillful enough to increase the incision and catch the artery with the hemostatic forceps, which it is very difficult indeed to do. It is also in contact with the internal jugular vein, the glossopharyngeal nerve, the pneumogastric nerve;

the hypoglossal and sympathetic nerves are also located in this region. You will remember the relation in your anatomy of the carotid artery, the internal jugular vein and the pneumogastric nerve, all in the same sheath, the nerve between the artery and the vein and internal to them.

Into the pharynx open certain tubes and cavities. Anteriorly and above the two posterior nares open, on either side, the two Eustachian tubes which pass from the nasal passage into the tympanic cavity of the ear, anteriorly the mouth, below the larynx and esophagus.



ARTIFICIAL NAIL.

The pharynx is composed of three coats: The mucous coat, which is continuous with the mucous lining of the nose, the Eustachian tubes, the mouth, the larynx and the esophagus; it is covered with columnar ciliated epithelim to the level of the floor of the nares, below with squamous epithelium. Below the mucous membrane is found racemose mucous glands. On the surface is found numerous crypts or recesses, the walls of which are composed of lymphoid tissue similar to that of the tonsils. To these crypts and recesses I desire to call your attention. A large mass of this lymphoid tissue is sometimes found on the posterior nasal passage between the Eustachian tubes. This is called the pharyngeal tonsil, hypertrophy of the lymphoid, tissue, adenoids, hypertrophy of the pharynx, Luschka's tonsil, or adenoid vegetation. Both in your freshman and junior years I spoke to you of the adenoids, and I have recently received a communication from a dentist on this subject, of which I will have made for you a number of copies. Several progressive dentists are investigating the effects of adenoids upon the deciduous teeth, and the relation, if any, of early decay of the teeth and the general health of children, to mouth-breathing. A child that is troubled with hypertrophy of the lymphoid tissue, or adenoid tissue, in the posterior nasopharynx is compelled to breathe through the mouth, because this mass lies directly back of the posterior naso-

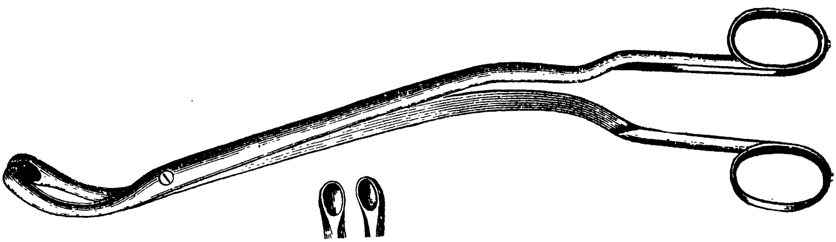
pharynx, and is often extended up into the nasopharynx. It not only causes the child to breathe through the month, but the cryptus or furrows in this are a lodging place for the mucus that normally should pass down from the posterior nasopharynx into the mouth, the nares become partly plugged, it simply comes back to the mass and is retained there, so we have a collection of mucus; and then the bacteria from the atmosphere, normally found in the posterior nasopharynx, infect, not the tissue, but the mucous secretions in that region, often causing a foul odor to the breath and a very discomforting feature to the patient. It also causes what we call a chronic inflammatory condition. Chronic inflammation is no more nor less than a continuous hyperemic condition. You will remember that in hyperemia we have no pus infection. When we speak of inflammation proper we mean a condition in which bacteria are present that will finally produce pus; when we speak of hyperemia we mean a congestion of these parts in which there are no bacteria present sufficiently active to produce pus. Therefore in this region we do not have an abscess form, we simply have irritation, a dilation of the capillaries, of the blood-vessels in that region, a hyperemic condition and an increased thickness of the fibrous tissue of this region. The vegetation here consists of an overgrowth of lymphoid tissue; it is not, as we formerly thought, glandular tissue.

Dr. Wm. Meyer, of Copenhagen, was the first to call attention to this growth and to point out a remedy. Ganghofner, Torwaldt, and Lushka are the three men who afterward took up this subject and investigated it, they were the first to describe it as glandular tissue, and they gave it the name of hypertrophied glandular or tonsilar tissue. As stated, this idea has been ovedcome, and we know now that it is not an overgrowth of glandular tissue—it is lymphoid in character.

No matter where you locate, the dentist will find this malady among the several classes of individuals. It has been found more frequently in the north temperate climates than elsewhere, but it is found from the equator to the most northern regions that have been explored—there is no climate nor region where the people are free from this growth. It is more frequent, as already stated, in the north temperate climates, and in the lower, damp altitudes of this climate. It is limited to no race—it is found in the American

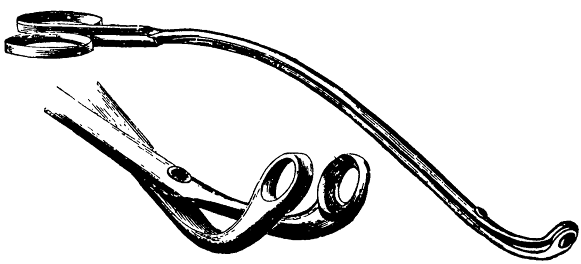
Indian, in the Caucasian race, in the Mongolian race, and even in the Laplanders and the people of the South Sea Islands. The high, dry altitudes in the north temperate zone are freer from it than any other part of this zone.

Statistics are always dry, but there is no way by which we can get at this subject any better or with any greater advantage to our-



LOWENBERG'S FORCEPS.

selves than to cite statistics showing the frequency of this disease, these statistics having been made by men who have had much practice along the line of nose and throat troubles. Dr. Ingals, of this city, Professor of Diseases of the Chest, Throat and Nose at Rush Medical College, claims that of all his cases of nose and throat



HOVELL'S FORCEPS.

trouble of every kind, two per cent. of them have hypertrophied pharyngeal tonsil; that is, of sufficiently marked degree to warrant treatment. When we take into consideration all the diseases to which the pharynx, the larynx and the nose are subject, and know that two per cent. of these are due to enlarged adenoid tissue, we see that it is quite a common disease. Out of two hundred cases of en-

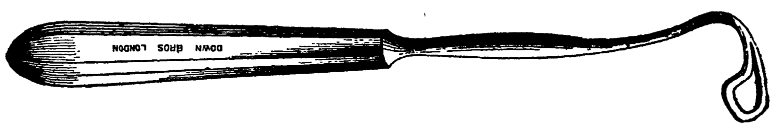
largement reported by Dr. Ingals, sixty per cent. of the patients were born in large cities and lived in large cities, while forty per cent. of them were from the country or very small towns. So we see that it makes very little difference whether a person is living in the city or in the country so far as the frequency of the disease is concerned. Meyer reports that out of one hundred and forty cases with disease of the throat, fifteen cases, or one in nine, were affected with adenoid growths. Robinson considers that the disease is infrequent.

For over five years I have been interested in the study of diseases of the ear caused by mouth-breathing. In the cases of children under twelve years of age that have come under my observation with chronic ear trouble, some of which cases have been discharging for a number of years, many of them ever since the patient was one or two years of age, I have found that the majority, I believe ninety per cent. of them, have been troubled with enlargements in this region. It is a question, however, whether the ear trouble was due primarily to infection going up from the nasopharynx through the Eustachian tube into the middle ear, or whether the chronic inflammatory condition in the middle ear has caused the catarrhal condition to pass down the Eustachian tube into the pharynx, bringing about a hypertrophied condition of this tonsil. But when the child comes to you early in life, perhaps one or two years of age, with no history of having suffered from one of the acute exanthematous diseases—scarlet fever, measles, chicken-pox, etc.,—and you find the enlarged growth, and at the same time an acute inflammatory condition of the middle ear, it will be known that the enlargement must have been in the throat before the appearance of the acute condition in the middle ear. In that case the infection must have traveled from the posterior nasopharynx through the Eustachian tube up into the middle ear.

The affection develops in children especially, but may be found at almost any age. It is more common in children than in adults, and it is another disputed question whether adenoid tissue of itself, without some other condition of irritation being present, will hypertrophy after puberty. Although hypertrophied adenoids have been found in individuals far advanced in years, it is more common between the ages of two and sixteen, and most common between the

ages of eight and sixteen. Meyer says that sixty-two per cent. of the cases that have come under his observation have been under the age of fifteen, while ninety per cent. of these cases occurred in early childhood.

The tissues of children in this region are very vascular, much more so than in the adult, also in children the mouth of the Eustachian tube, or the cartilaginous part of it, is open, that is, the sides do not come absolutely in contact, while in adults the mouth of the Eustachian tube is normally closed; therefore you will readily see why disease would travel from the posterior nasopharynx up



GOTTSTEIN'S CURETTE

into the ear more readily in children than in adults. Irritation sets up the congested or hypertrophied condition, causing the patient to complain of a constant "cold," with mucus discharging from the nose and pharynx. This is not because these children are susceptible to colds any more than anyone else; it is due to the fact that the discharge coming from the posterior nasopharynx glides back in the crypts, causing an irritation, and as soon as cold air strikes this or the child gets damp there takes place a congestion of the mucous membranes of the nasopharynx, the larynx, the pharynx, and, in fact, all the mucous membranes of that region. The air which is inspired on a damp, wet day will cause a congestion of these membranes more than the warm, dry air of a sunshiny day. The greater the irritation the more profuse the secretion, and this secretion going back into the nasopharynx and lodging at the adenoid tissue causes constant cold in the posterior nasopharynx, and as this discharge normally cannot back through the posterior nasopharynx into the mouth, it becomes lodged and is infected, keeping up a constant irritation, and consequently the child is subjected to the annoyance of a continual discharge through the anterior nares.

There is one other condition in early childhood which must be diagnosed from this, and that is syphilis. A child suffering from

hereditary syphilis has symptoms very similar to those of adenoids; there is hypertrophy of the mucous membrane, there is a chronic discharge from the nasopharynx and from the anterior nares, and a tendency to frequent cold. The history or the appearance of the child will at once tell you whether the child is a victim of adenoid growths or of hereditary syphilis.

Adenoid tissue may form later in life, but it is not as a rule formed after puberty, and it is the rule for adenoid tissue to atrophy or to shrink down at puberty; a change nearly always takes place in the posterior nasopharynx at the time a child comes to manhood or womanhood; the fibrous tissue contracts, causing a lessening of the growth, but the crypts still remain, and the mucous glands surrounded by fibrous tissues which contract, are pressed upon, and after puberty there is a lack normally of secretions in this region due to the pressure upon and consequent death of the mucous glands in this region, causing the so-called atrophic condition of the parts, similar to the atrophic shrinking following acute hypertrophy and atrophy of any other part. There is, then, a lack of the secretion from the mucous glands in the posterior nasopharynx, causing crusts to form (composed of dust and mucus) which are either blown out from the anterior nares or on inspiration are caused to pass back into the nasopharynx and are expectorated, causing a very disagreeable sensation to the patient. Shirley reports one case in which the adenoid vegetation developed after the age of twenty years. A. Brendd says they are common before the age of three years.

Diagnosis.—Normally the nasopharynx of children has a firm resistance to the touch. I wish the dentist to particularly note this, because he will have an opportunity in your practice to examine the nasopharynx of children when they are brought to him and if it is not examined you will sometimes be led astray as to the cause of the malady for which the child is brought to him. In children you cannot examine the nasopharynx with the rhinoscope. The sight of a mirror frightens a child, causing him to gag, and it is useless to attempt to gain the confidence of the child so that you can place a mirror in the pharynx and throw the light up into the posterior nasopharynx. The finger is the index by which you will have to be guided.

Before the examination it is always wise, if there are any decayed teeth in the mouth of the patient, to take a strip of adhesive

plaster and pass around the finger from the second joint up to the knuckle to protect it from the biting of the child with a snag of a decayed tooth. I have known of several physicians being laid up for an indefinite period after operating on children for adenoids, due to the gag slipping out of the mouth and the child biting the finger, causing infection and blood poisoning, and one prominent physician in this city nearly lost his life as the result of a slight accident of this kind, and which could have been avoided very nicely if he had placed a piece of adhesive plaster around his finger.

The diagnosis is easily made. Place the child in a standing position at your side, pass your arm over his head, letting the elbow rest on the back of the head, or let the child lay the head right back against the bend of the elbow; then press the hand under the chin, holding the child's head very firmly, having one hand of the child back of you and holding the other in such a position that he cannot get it to his mouth or pull your hand away from his mouth, then draw the child in against your hip; almost any child will open the mouth so that you can get started, and after you once get the finger in the mouth keep it going, and as soon as you get the finger back into the posterior nasopharynx the child cannot bite, it gags the patient and the mouth comes open. When you start to remove the finger you must do so quickly, for the patient will catch the finger between the teeth before you get it out if you are not careful. First press the finger right back along the tongue, having the finger curved so that you will not cause an irritation until you get back to the pharynx, then by quickly turning the hand over so that the tip of the finger is up, the back of the finger is thrown against the tongue, when the child immediately gags, and from that time on the mouth cannot be closed; then pass the finger back of the uvula right up until you can touch the septum of the nose. When you let the tip of the finger rest against the posterior pharynx, if the pharynx is normal it will feel smooth and have a firm resistance to your finger. If for any reason the pharynx seems "mushy," as we might say, or seems rough and as though there was present a thickened tissue, or there is a jelly-like feeling to the posterior nasopharynx, you will know that there is a pathological condition. Always pass the finger up until you can feel the septum of the nose. If the child is in a normal condition and no violence is produced in making the examination, when the finger

is withdrawn it will simply be covered with mucus. If you have present a hypertrophic tissue, when you remove your finger it will be steeped with blood. The finger nail should be short so as not to abrade the delicate mucous membrane. After you have once examined the nasopharynx and felt the abenoid tissue, you cannot be deceived, and after you have once examined the normal nasopharynx and felt the resistance to the finger you cannot be deceived. Your finger will tell you how much adenoid tissue is present, because in the examination you can take as much time as you please—a child can hold its breath three-quarters of a minute nicely; it will not breathe while your finger is back there, but take your time and make a thorough examination, because you will not get the chance to examine the patient a second time; therefore finish your examination at the first sitting.

The growth, as I have already stated, extends into the posterior nasopharynx. Then again, you can often, if there is no hypertrophy of the turbinated bones, examine the posterior nasopharynx by throwing reflected light in from the anterior nares, and, in the case of an adult, a rhinoscope may be used, passing it back of the uvula and reflecting the light back into the nasopharynx; or, better in any case, with the tip of the finger you can examine for this tissue. It is sometimes, however, very difficult in grown individuals to get the finger back up against the septum on account of the shortness of the finger or the length of the posterior nasopharynx, it is sometimes impossible to get the finger up so far, and then again, a grown person is so strong that you cannot always hold him and he will get the head back out of the way. So it is better to examine these individuals with a rhinoscope, you will generally have very good control of them, and there is one very marked feature that you will notice in regard to individuals troubled with chronic catarrh, and that is that the throat is not sensitive; you can touch the posterior nasopharynx with the rhinoscope and the patient will not feel it, and for that reason the soft palate is not thrown out of position and the tissues are not contracted, and you can see very nicely. If a person is not troubled with this condition the anterior and posterior nasopharynx is very sensitive, when examination of these parts will cause a gagging, a drawing up of the posterior muscles and the uvula as soon as you touch that region.

(To be continued.)

IN MEMORIUM

DR. O. T. HANSON; DIED NOV. 18, 1902.

But souls that of his own good life partake,
  He loves as his own self; dear as his eye
They are to Him; He'll never them forsake:
  When they shall die, then God himself shall die.
    They live, they live in blest eternity.
                    —*Henry More.*

Owen Thomas Hanson was born in McLean County, Illinois, Feb. 22, 1861. Until he was eighteen years of age his life was spent at the home place. His preliminary education was obtained at the Normal University. He commenced the study of dentistry in 1884 with Dr. Schofield, of El Paso, Ill., as preceptor. He gradüted from the Ohio Dental College of Cincinnati in 1888, and immediately entered into practice at Lexington, Ill., succeeding Dr. C. T. Gray, retired. Dr. Hanson was a successful dentist and an enterprising, public-spirited citizen. He was an active and influential member of the Board of

Education for six years, a member of the official board of the Methodist Church, superintendent of the Sunday-school, leader of the choir, and vice president of the city Library Board. He was a member of the I. O. O. F., K. of P., Modern Woodman, Fraternal Army of America, and the Royal Circle. During the funeral services, which were held Thursday, Nov. 20, the schools, banks and business houses were closed and business suspended. The deceased was peronally known to the publishers of the AMERICAN DENTAL JOURNAL, and we mourn the loss of an honored friend. We extend to the wife and daughters our heartfelt sympathy.

RESOLUTIONS ON THE DEATH OF DR. ANDREW B. MASON.

At a special meeting of the Toledo Dental Society, held Nov. 13, the following resolutions on the death of Dr. Andrew B. Mason were adopted:

WHEREAS, The members of the Toledo Dental Society have learned with deep regret of the death of Dr. Andrew B. Mason, an honored member of this society; therefore, be it

Resolved, That by this sad event dentistry has lost one of its pioneers, the city of Toledo an honorable citizen and the world at large a Christian gentleman. We shall cherish with grateful remembrance his services to the profession and strive to emulate his example.

Resolved, That we extend to the bereaved family our sincere sympathy in their great loss and that a copy of these resolutions be spread upon the records of the society and transmitted to the members of the family.

E. D. GARDINER,
L. T. CANFIELD,
A. D. WILLIAMS,
Committee.

EVERYBODY'S COLUMN

This column will be devoted to matters which any dentist may wish to bring before the profession: whether it conflicts with our ideas or not. You are invited to make use of it and we assume no responsibility.—EDITOR.

CARMICHAEL'S OFFICE RIGHTS.

The Other Point of View.

The question whether or not it is a violation of the ethical code to dispose of office rights is attracting the attention of the dental profession, and is being discussed in its various phases to a considerable degree. From an editorial which appears in the second number of THE AMERICAN DENTAL JOURNAL, under the caption of "Office Rights" conveyed the idea, it seemed to me, that it was made apparent that I was making a charge for the demonstration instead of the office right, in my system of bridge attachment and inlay work.

My system is patented, speaks for itself and is open to public inspection and investigation at all times. To employ it successfully the operator must be skillful and well instructed. Therefore, to accomplish this purpose in the hands of others, I decided to furnish each dentist desiring it, a permanent office right at the price of a demonstration, or, in other words, at the cost of instruction in the method.

My system has been employed with great success by the many who have adopted it, and I find our best crown and bridge workers enthusiastic over the success of their operations under it. I may add that to a man they are pleased, also, with my plan of introducing it. All who have adopted the system agree that they are willing to pay so reasonable a fee for this system of work, brought to them in all its perfected details, and with the necessary instructions and appliances to enable them to adopt it into their practice.

A few prominent men in our profession have opposed it, as they are opposed in principle to all patents in dentistry. These gentlemen by what they say and write upon the subject seek to convey the impression that the profession at large thinks and believes as they do. They are in error. The mighty pace of improvements in dent-

istry in America cannot and will not thus be arrested and paralyzed. Development and perfection of a patentable process in our walks of professional life must go on. The ultimate object of all improvement is the result to the consumer, not the operator. To the patient—not the dentist. One of the objects of the Patent Office is to stimulate ingenious minds to perfect new and useful improvements to the great end that the human race may be benefited.

On a recent trip I visited a number of large cities, including New York, during which I sold over four hundred office rights. I was thus enabled to obtain an expression of the sentiment of representative dentists on the subject of patents in dentistry. These expressions might be summed up in the pithy remark of Dr. William Carr, of New York City, who said: "A man has a right to profit by anything his brain will produce." After thorough investigation, many of our leading colleges have adopted the system which I have patented, and it will be taught, with the understanding that graduates may secure office rights to use the method in their private practice. All schools may also secure a college right without charge, on the same conditions. To place this work within the reach of all, the dental laboratories will be furnished with license to do this work for any dentist upon the payment of a nominal fee for each attachment, thus giving dentists who are doing but little crown and bridge work an opportunity to use it in a few special cases. To those who are skeptical this will open an easy way to satisfy themselves of its value, before securing a permanent office right. Work under my method has stood the test for thirteen years, and it has taken its place in dentistry to stay, which is evidenced, not only by my own experience but by that of others who have applied the work with equally good results. A further proof of its merit is found in the fact that it has now been incorporated in the new addition of Dr. George Evans' text book on "Crown and Bridge Work."

It is a fact that had I not caused my invention to be patented, making it possible for me to control it and to advance it, as one of the most important steps in the progress of dentistry, the knowledge of it could have remained in my own private practice, there being little encouragement for me to acquaint my competitors in business with its details to my own financial loss. I am willing that my professional brethren shall share with me the benefits accruing to my patented system, the results of years of professional experiment, directed

by whatever natural ability I possess, for a very nominal fee.

Operating under the opportunity thus extended, the earnest, expert builders of our noble profession cannot increase the cost to them, and at the most add a small sum to the bill of those who gratefully enjoy, through an extended period, the blesings which invariably follow the adoption of my system.

In the teeth of the great unidentified dead of ancient Rome and Greece are found bits of ivory and other substances adopted by the dentists of those days to aid their fellow men, and from that time to this the march of dentistry, though slow for centuries, has ever been toward perfection. Coming into the profession in our own time, I could not—did not and will not—accept it as perfect so long as I am able to continue in its labors. This is a striving, busy world. The pace is now faster than ever. I am doing my best to keep abreast with the procession. With this advancement all things change—the old order is constantly making way for the new. Dentistry, like the rest, must meet the demands of the times. Its advance agents and operators must not waste time seeking to tear down the work of others who are willing and doing the real work, but all should put forth the essential energy, good faith, and all of their ability to encourage and stimulate the ideas and practices of those who prove by all that there is in them that the wood and ivory of their professional ancestors shall be substituted by methods that are as painless as possible and which will produce results as comfortable and almost as perfect and beautiful as the original work of the great Creator. With universal education the people of this country, the patients of dentistry, are crying for these accomplishments, and they will be satisfied with nothing less. Do not, I beg of you my professional brethren, waste your time blocking the wheels of progress and retarding the zeal of others, but rather use your experience and ability in meeting and overcoming the many obstacles which are before us. Men are nothing—ideas are everything. For the device of bridge work which I have conscientiously evolved, I ask only your fair and candid consideration. Try it and observe its efficacy --use it and reap its reward, not at any expense to you, but as you would use any other meritorious device in your practice—ultimately always at the cost of those who enjoy it.

The history of the world's dentistry has demonstrated that for many centuries this grand and noble profession, devised by man for

the alleviation of human agony, the prolongation of life and its enjoyment, was abandoned to the uncultured barber, horse farrier and blacksmith, and that during all of this period, unprotected and unaided by wise laws, even the proficiency of the dentists of the ancients, was lost amid the ignorance and prejudice of the dark ages. Can it be argued that during all of these ages that humanity was so differently constructed, that men, women and little children suffered less then than now, the pain and torture that made life miserable and often destroyed it, because of the diseases of the mouth and teeth? Can it be reasonably argued that during all of this time the people of the civilized world did not have adequate wealth with which to purchase relief from their decaying and diseased teeth as fully as they now are able to do so?

No, no. It was not because man suffered less or that he did not have the price. Whatever may be the individual opinion it remains an unalterable fact that our noble and beneficent profession was never taken from the hands of the blacksmiths, the horse doctor and the barber until a wise system of laws were adopted, pledging the integrity of the governments of all civilized people, that every one should receive the value of his invention and device and be protected in the enjoyment of its emoluments. With the opening of this door the world speedily grew to a new condition of things, and countless numbers of earnest, thinking men and women, dedicated their lives and all of their abilities to human progress. And I am glad that I am

Look at the giant strides of our profession in the last fifty years alone. Observe the army of trained thinkers and operators in the busy arteries of our professional life, who have come up out of the darkness of the dentistry of the gloomy past, to intelligently administer to the welfare of their fellowmen. Reviewing the history of dentistry in America for the past half century it would seem that the profession as a whole, or in private associations, might better adopt a system of prizes or rewards for devices to perfect and aid dentistry, than to band itself into clubs or associations and contribute money to be used to defeat, regardless of merit, the operation of the national law, guaranteeing to their more industrious and capable associates, the enjoyment of their patented dental devices.

If the dentists of America have the real interests of the dental profession at heart, they will emphatically reject all measures that tend to retard or arrest the profession in its triumphant march to per-

fection in every detail. A broad and magnanimous spirit on the part of the profession toward every one who meritoriously aids the cause by new and helpful ideas, alone can stimulate each man to do his best. To bring, as a patentee, the results of years of careful experiments and the best thoughts of your mind, ripened in professional zeal and experience, to the door of the profession, to be met with libelous abuse and threatened litigation, can have but one effect, which is too plain and palpable to need discussion. The unfair and intolerable plans of some of our profession who apparently wish to enjoy the fruits of another, under the specious plea of professional ethics, if successful, would establish such a precedent that there would be no longer any incentive to advance a step beyond the point already reached in dentistry. To thus shackle all advancement in the progress of American dentistry would be a calamity indeed. I believe that I am truthful and safe in saying that the practice of dentistry has just emerged from its swaddling clothes. Will the majority of the members of this profession consent to any line of action that will stay its progress toward far greater achievements?

I am fully convinced that the dental profession, as a body, is too fair and intelligent to array itself against inventions that bless and perfect dentistry, even though patented, or that dentists will continue to cut off good teeth and crown or cover them with gold, simply because a method which obviates this necessity is patented under wise laws framed by our national government. The demands of the public will certainly compel the dental practitioner to keep pace with the progress made in his own profession. The day is not far distant when my professional brethren generally, will acknowledge that my system will lift bridge work from the mediocrity where it has so long rested, to a work of merit, artistic and hygienic, separating advanced and skillful operators from the every-day, and giving the competent and ambitious dentist an opportunity to charge and earn a fee commensurate with his ability.

J. P. Carmichael, D. D. S.

Editor American Dental Journal,

Dear Sir: A sample copy of your Journal reached me a few days ago, for which please accept thanks. I am very much pleased with the Journal and have derived considerable satisfaction in reading its contents, although I am compelled by force of circumstance, to take

some exception to one of the papers published. There is not any too much honor to be derived from presenting to the dental profession one's ideas, methods and inventions, under general conditions, as it almost always involves the giver into numerous controversies as to whether he originated certain methods, ideas and inventions or purloined them from someone else.

I can readily understand that in the course of practice and investigation two men in the same profession, though widely separated and living in different sections of the country, may invent something similar at or about the same time. I have had that illustrated in more instances than one in my own life, not only in inventions pertaining to dentistry, but that of other lines. This fact has made me very careful in publishing and claiming as original anything in or out of my profession without first investigating very closely as many publications as possible covering the subject matter.

Had Dr. George E. Quinn,* whose paper on "Methods of Crown and Bridgework" read before the Northern Ind. Dental Society, September 24-25, 1902, and published in your JOURNAL of November, 1902, been equally as careful I would have been saved the trouble of calling his attention to several errors in his "claims department."

He begins his paper by stating "No apology is necessary," but I beg to differ with the gentleman upon that point. I feel sure that after further investigation he will so decide. His paper would have been a credit to himself and his profession, were it not for the fact that he gives no credit to the inventors of the methods he claims as his own, direct or by inference. I wish to call his attention to the fact that practically everything he claims has been published over my signature with the exception of his professed method of half bending a root, and that has been published so many times and by so many different men it does not require specifying. In the July number of the *Items of Interest*, 1902, page 499, he will find I am credited by Dr. H. J. Goslee with all that is practical of his "replacable facing" method figs. 8 to 12 of his illustrations. As the *Items of Interest* reaches nearly every dentist in the United States, it looks suspicious to say the least that his paper should come out just after this publication, and what makes it the more suspicious is the following quotation from his paper: "And the S. S. W. Company catalogues two different sets of instruments, quite complicated, for the purpose of

*This letter referes to paper read at Northern Intiana Dental meeting by Dr. Gearge E. Zinn, a misprint making it read George E. Quinn.

replacing facings without removing the work from the mouth, which goes to show the demand for some method to overcome the trouble of broken facing. One of these methods is essentially the same as what I used in '93 and '94." Which method he refers to, I am not aware, but judging from the above quotation and the date given, the closeness of his paper to the publication of my methods in the July *Items* of 1902, the publication of my methods of repairing facings broken from bridges and crowns in the *Cosmos,* June number, 1894, page 470, proceedings of Union Meeting of D.C. and Md. Dental Societies force me to conclude my method was aimed at. If that is so, I wish to call his attention to the fact that he did not go back far enough in his dates, and refer him to the April number, 1891, to my article, "Removable Bridges, Crowns and Facings," published by the *Dental Cosmos* of that date, and then to a United States patent granted me on the same thing August 12, 1890.

My advice to members of our profession in making claims for methods, ideas and inventions, is "to look before you leap." Sincerely yours, EMORY A. BRYANT.

REPLY TO CRITICISM OF PUBLICATION COMMITTEE.

ILLINOIS STATE DENTAL SOCIETY.

After perusing the courteous and liberal criticism of the actions of this committee which appeared in the last issue of the AMERICAN DENTAL JOURNAL, complimentary copies of which were, as usual, duly received, we feel constrained to say in reply that the resolutions in which the above JOURNAL was censured, were adopted at a previously called meeting of the committee, at which a majority were present; that they were written by the chairman, without material assistance, counsel or advise, and after some modification were approved by both of the other members; and that the original copy is still preserved and bears the signatures of the full committee.

Being the representatives of a dignified professional body we further assert that no coercion or undue influence dominated our action, or was necessary; that we were fully cognizant of our duties, and adequately familiar with that portion of the by-laws in which they are prescribed; and that this action was prompted only by an appreciation of these duties, and of the necessity for condemning the

premature and irregular publication of matter which rightfully and properly belonged exclusively to the Society.

In accordance with a reasonable, and the general and literal acceptation of the term, the article as published in the AMERICAN DENTAL JOURNAL was in no sense an "abstract." It is our judgment that the discussion also was not published for the simple reason that the said JOURNAL did not have access to the stenographic report, or transcript copies, thereof. The president of the Sociey was present when the resolution was adopted, and it was further submitted to two members of previous publication committees and met with the full approval of all. The action was not prompted by petty personal feeling, or a desire to injure, vilify or slander, but solely for the purpose of doing our duty as editors and guardians of the transactions of the Society until published in due and prescribed form, and establishing a precedent which might be the means of putting a check to such irregular procedures and transgressions.

We further believe that the society will not hold this committee responsible for similar irregularities which ANTEDATED our term of office; that as a body it is old, large and strong enough to know whether its transactions are published before they get "stale" or not, and to select its own publisher, notwithstanding the doubtless valuable (?) suggestions offered by such experienced, self-appointed critics.

The committee stands by this action, and, in turn, suggests to the American Dental Journal that in case they feel justified in taking exceptions thereto, they have recourse to the society in general session for vindication, reparation and just punishment for any wrong done, which action we invite.

Signed.

HART J. GOSLEE,
D. M. CATTELL,
G. WALTER DITTMAR,
Publication Committee.

Chicago Nov. 26, 1902.

NOTICES OF MEETINGS

The Pennsylvania Association of Dental Surgeons held its fifty-sixth annual meeting on the evening of October 14, 1902, at the Continental Hotel, Philadelphia. The following officers were elected to serve during the ensuing year: President, Dr. Wilbur F. Litch; Vice-President, Dr. George W. Cupit; Secretary, Dr. J. Clarence Salvas; Treasurer and Librarian, Dr. William H. Trueman.

During the past year the following papers were read and discussed before the society: "Combination Fillings," by Dr. Joseph Head; "Obtundents," by Dr. Charles S. Moore; "The Difference in Method of High and Low Fusing Porcelain for Filling Teeth," by Dr. W. A. Capon; "A Practical View of the Plastics," by Dr. J. Clarence Salvas; "Alveolar Abscess: Its Complications and Treatment," by Dr. J. F. Wessels; "The Danger of Infection of the Eye of the Dentist While Operating," by Wendal Reber, M. D.; "Calcification of the Dentin and Enamel, and Its Relation to Hypersensitiveness of These Tissues," by Dr. I. N. Bromell; "Adenoids and Their Relation to Oral Deformity," by Dr. M. I. Schamberg; "A Sketch of Edward Hudson," by Dr. William H. Trueman; "General and Local Anesthesia, with Special Reference to Its Application in Operations Within the Mouth," by Dr. E. Quin Thornton, M. D.

J. CLARENCE SALVAS, Secretary.

The chairman of the Executive Committee of the Illinois State Dental Society has sent out the following letter to the members:

ROCKFORD, Ill., Oct. 1, 1902.

DEAR DOCTOR: Enclosed find card which please hang in your laboratory. Any questions that may arise in your practice between now and March 1, 1903, kindly jot down on this card. On the above date (March 1, 1903) put a one-cent stamp on and drop in the mail box.

No one will know by whom questions are asked. Your questions will be answered by a member of the society capable of giving it the fullest consideration at the meeting of the Illinois State Dental Society, held at Bloom-

ington, May 12, 13. 14, 1903. Don't forget to ask questions. Don't fail to hear the answers. CHAS. J. SOWLE, Executive Committee.

It is hoped this card will be given the attention it deserves, as great good can be accomplished by having this little "query box," all questions being answered by men competent to answer the same intelligently.

The committee having in charge the arrangements for the Odontographic clinic have arranged to hold the same at the Northwestern Dental School, at the corner of Dearborn and Lake Streets. This was certainly a wise selection by the committee, as it is the most centrally located place and gives plenty of room to the big crowd which will be in attendance.

Personal and General

Dr. William K. Elliot, of Parnassus, Va., died Nov. 20 of typhoid.

Dr. Arthur Motter, formerly of Peoria, is now located at Henry, Ill.

Dr. Cameron, formerly of Spokane, is now located in Wenatchee, Wash.

Dr. P. R. Copple, formerly of Greeley, is now located at Central City, Neb.

H. J. Basart, a dentist of Springfield, Ohio, lost a quantity of gold through robbers Nov. 12.

Dr. E. W. Conway, who formerly practiced dentistry at Brookston, has located at Lafayette, Ind.

Dr. Louis C. Fuller, a Kansas City dentist, suffered a stroke of paralysis and is in a critical condition.

The office of Dr. F. F. Hoyer, Owosso, Mich., was badly wrecked by the explosion of a vulcanizer.

Dr. Ed Q. Naghel, formerly of Louisville, but later of San Francisco, lies dangerously ill in the latter place.

The Ohio State Dental Board held a meeting at Columbus, Ohio, Nov. 18. There were fourteen applicants for examination.

Dr. H. E. Hawk, of Dayton, has been appointed dentist for the Ohio Soldiers' and Sailors' Orphans' Home at Xenia. The appointment was made Nov. 8 by the board of directors.

The Missouri State Board of Dental Examiners have made mandatory orders compelling students of dental colleges to cease the practice of dentistry during attendance at college.

Dr. Frank A. Baden, of Baltimore, died alone and unattended in a hotel in Richmond, Va. He is said to have been an habitual user of cocaine.

The regular meeting of the Valley District Dental Society was held at Holyoke, Mass., Nov. 17, with Dr. A. G. Doane, of Northampton, presiding.

The correspondent at Prince Albert for the Winnipeg (Man.) *Free Press* is authority for the statement that a dentist is required at the former place.

Dr. F. A. Wood, the dentist who so mysteriously disappeared from his home, Richmond, Va., Aug. 7, was located Nov. 14 in a hospital in New Orleans.

Dr. Henry M. Ragon, one of the oldest dentists of Bath, Me., and a naval veteran, is suffering from severe paralytic shock and his life is despaired of.

The New York Dental Parlors, of Rochester, N. Y., have been sued by Miss Kitty Pease, a patient, for $100 damages. The plaintiff alleges that the nitrous oxide gas made her ill, and that her silk dress was ruined as a consequence.

Lauren C. Copp, Clay Mills, George Matt and Charles Pankow, students at the University of Buffalo, were scalded by the explosion of a vulcanizer in the laboratory of this college. The accident is said to have been caused by defective adjustment.

Lorne Wilkie, a dentist of Farmersville, Ohio, has been held to the probate court on a charge of practicing dentistry illegally. Wilkie, though a regularly licensed dentist, had failed to display in his office a certificate from the State Board of Examiners, as required by law.

The Central Dental Association met in Newark, N. J., Nov. 17. The subject discussed was Liquid Oxygen. The Interchange of Licenses was also discussed. New Jersey dentists objected to the habit of New York dentists practicing at the seashore during the summer months.

At the annual meeting of the District of Columbia Dental Society the following officers were elected: L. F. Davis, president; William D. Monroe, vice-president; S. W. Bowles, recording secretary; William S. Donnally, corresponding secretary; M. F. Finley, treasurer; H. C. Thompson, librarian.

Henry J. Topp, a dentist of Brooklyn, N. Y., has applied to the courts for an order compelling the county clerk to restore his name as a registered dentist on the records. Topp's registration in the county clerk's office was cancelled because of his conviction of a felony. He had been convicted of grand larceny.

Dr. W. J. Addenbrooke, of Milwaukee, is preparing to enlist the sympathy of some of the large manufacturing concerns of that city employing a large number of children with a view to establishing a free dental infirmary, where the children's teeth may be cared for without expense to the parents. Dr. Addenbrooke contends that the good that would result to the community would be inestimable.

The Dentists' Association of New York was organized Nov. 7 and the following officers elected: President, J. L. Clark; vice-president, C. R. Moulton; secretary, G. E. Cooney; treasurer, E. R. Moulton. The Association has forty charter members. The object of the Association is to compel a stricter enforcement of the laws and prosecute every dentist who is not registered. There are said to be one hundred illegal practitioners in Brooklyn alone.

The California State Board of Dental Examiners held a meeting Nov. 18 at San Francisco. Dr. C. Herrick, of Jackson, was elected president; Dr. F. G. Baird, of San Francisco, secretary.

The Indiana State Dental Association will ask the coming legislature to enact a law requiring examination of applicants for registration on presentation of diplomas. The legislative committee, consisting of John Q. Bryan, Horace M. Thompson and George Edwin Hunt, is sending letters to all members of the House and Senate urging support of the bill they intend to introduce.

Twenty-six States have already passed laws requiring examination of dentists by a State Board, and unless Indiana follows the example it is argued that the State will soon become the objective point of alleged dentists and "fakes."

The change in the law governing the practice of dentistry is not to affect those now engaged in it, but the purpose is to shut out incompetents in the future.

Wherever you go in foreign lands you find American dentists, and they are the most popular and successful members of their profession. In Japan, China, India, Turkey, Greece, Italy and all the European countries, and in the cities of South America, Yankee dentists have the cream of the practice, and have so excited the envy of the native practitioners that the local legislatures everywhere have passed laws to prevent further competition. In Rome, for example, a graduate of Northwestern University at Evanston, tinkers the teeth of the king, the royal family, the members of parliament, the diplomatic corps and everybody else who can afford to pay his fees, and yet his very patients passed a law requiring foreign dentists to submit to examinations and comply with conditions that are practically prohibitory. The same methods have been adopted in Germany, France and other European countries to shut out Americans and protect home industry, but at the same time there are very few dental schools outside of the United States, and most of them are incompetent to educate a man in the modern science of dentistry. That is the reason why so many foreigners come to the United States to study dentistry.

Philadelphia used to monopolize dental education, but within the last few years Chicago has been gaining rapidly upon her, and if the increase continues as rapid as it has been in the past Chicago will run ahead very soon. Last year 1,231 young men and twenty-seven young women were studying dentistry in the three schools of Chicago. Three of the women students were in the dental school of the University of Illinois and twenty-four were in the dental school of the Northwestern University. The Chicago College of Dental Surgery is not co-educational. Its enrollment for the term 1901-2 was about 600, and represented twenty-eight states and twelve countries, as follows:

California	4	Montana	4
Colorado	3	Nebraska	7
Idaho	4	North Dakota	6
Illinois	155	New York	6
Indiana	24	Ohio	6
Indian Territory	1	Oklahoma Territory	1
Iowa	50	Oregon	3
Kansas	10	Pennsylvania	3
Kentucky	2	South Dakota	16
Louisiana	2	Texas	4
Michigan	28	Utah	6
Minnesota	47	Virginia	1
Mississippi	2	Washington	6
Missouri	5	Wisconsin	98

FOREIGN.

Austria	2	Holland	5
Australia	5	Italy	1
Armenia	2	Norway	3
Canada	51	Sweden	2
England	1	South Africa	1
Germany	3	Turkey	2

The Northwestern University Dental School had in attendance last year 523 students, of whom twenty-four were women. There were 164 graduates, of whom eight were women. The students came from the following states and foreign countries:

Illinois	182	Oregon	6
Iowa	57	Tennessee	5
Wisconsin	49	Ohio	5
Minnesota	37	Texas	3
Michigan	26	Pennsylvania	3
Indiana	22	Kentucky	2
Nebraska	16	Montana	2
South Dakota	13	Oklahoma	2
Kansas	10	Utah	1
North Dakota	10	New York	1
Missouri	8	Washington	1
California	6	West Virginia	1
Canada	24	England	1
Germany	4	Scotland	1
Sweden	2	Poland	1
Australia	2	Norway	1

The dental department of the University of Illinois had 180 students, of whom more than half were from Illinois. Fifteen other states, Canada, Germany and British Guiana were also represented.—William E. Curtis, *Chicago Record-Herald.*

DENTISTS IN HAWAII GROWING WEALTHY RESTORING TEETH OF REFORMED NATIVES.

OLD CUSTOM WAS TO KNOCK OUT AN INCISOR WHENEVER A RELATIVE OR FRIEND DIED, BUT THIS IS ABANDONED AND NEW ONES ARE WANTED.

Honolulu, Nov. 17.—Hawaii is the dentists' paradise. The reason that the territory is not flooded with members of this profession is because the prospects are not appreciated elsewhere. Those dentists who are so fortunate as to be loaded in Hawaii are thriving. Their practice is steadily increasing. They are becoming wealthy. The demand for dental work is due to the Hawaiians desiring to remove all traces of one of their ancient customs.

It was formerly the custom among Hawaiians, and in certain localities it is observed to this day, to go into mourning for people by knocking the front teeth. Whenever a relative or dear friend died one of the front teeth would be sacrificed. Four teeth was generally the limit for one person to destroy. The appearance caused by the absence of the front teeth was, in many instances, grotesque, especially when the eyeteeth were of more than average size. For generations this custom was one of the most common, as well as important. Nothing was thought of it. Old and young alike would be called upon to make the sacrifice. The Hawaiian race has naturally beautiful teeth, and this unnatural custom disfigured men and women alike.

Within recent years the custom has disappeared. The members of the

younger generation have adopted the manners and ways of the white race. One of the earliest things they saw was the very apparent fact that their appearance would be greatly enhanced if they were provided with front teeth. A demand for delicate dental work resulted. The young girls were especially eager to have their missing teeth replaced.

The demands were varied, and in the majority of instances expensive. The work was of a very delicate character. The cost did not deter them in the least. The result has been that within the last three or four years a girl with her front teeth missing is a very uncommon sight in the city of Honolulu. The desire to have the error of the early custom remedied is not restricted to the younger generation. Older people have had the same dental operations performed for them.

The candidates for new teeth seem unlimited. Every dentist in Honolulu is kept busy. In districts on the other islands the demand for new teeth is not so general. A traveling dentist would coin money if he could but catch the fancy of his patrons. It does not follow, however, that all Hawaiians are minus their front teeth. Thousands of them were never subjected to such painful operation, and invariably they are the possessors of magnificent molars.—*New York Herald.*

ROCKFORD DENTAL SOCIETY.

The Odontological Society of Rockford held its annual meeting last night at the Nelson House. The occasion was, as usual, a banquet in connection with the meeting, the wives of the dentists being invited.

The banquet was served in the ordinary of the Nelson and about twenty-five were present. Following the banquet Dr. A. M. Harrison, the retiring president, read his annual address, and the election was then held. It resulted as follows:

President—Dr. J. L. Palmer.
Vice-President—Dr. C. B. Helm.
Secretary-Treasurer—Dr. R. J. Hollenbeck.
Member Board of Censors—Dr. C. J. Sowle.

The society holds regular meetings at the offices of the members during the winter and a social event of some sort each summer, and in this way preserves a fine esprit de corps among the members of the profession in Rockford. The papers prepared and discussed at the meetings are of great value to the dentists.

A CORRECTION.

EDITOR OF THE AMERICAN DENTAL JOURNAL:

Dear Sir—On page 287 of your journal, October number, I gave a formula for a lotion to be used in gingivitis. As printed it is an error. The oil of cloves, specific cactus, and specific echafolta should be proportioned in drachms instead of ounces. The mixture calls for but one ounce. I deem the formula of so much importance and value that I give it again entire. It should read:

Rx.	Cocain	20 grs.
	Oil of Cloves	2 drachms.
	Specific Cactus	1 drachm.
	Specific Echafolta	2 drachms.
	Glycerin (pure) to make	1 ounce.

Sig. Apply with brush to inflamed gums.

A. C. HEWITT.